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## NEWS

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**ON THE COVER:** With an impressive 6-foot wingspan, the HobbyKing B-17 Flying Fortress is an impressive model, yet it only takes a few hours of assembly. Our full review is on page 34. (Photo by John Kauk)

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DuraFly 1100mm Supermarine

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Prop: 11.25 x 7 3 Blade

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# Preflight

BY DEBRA CLEGHORN | EXECUTIVE EDITOR

## From Trainers to Jets

**THE DIVERSITY OF RC MODEL AIRCRAFT IS ASTOUNDING.** From small indoor fliers to giant turbine jets, built-up wood to foam construction, and precision scale replicas to 3D performers, there are all types and sizes of planes and now even multirotor drones. This February issue certainly reflects the tremendous variety and breadth of the RC aircraft hobby. We start with coverage of the Best in the West, a gathering of turbine- and electric-powered jets that attracts pilots from around the globe. This weekend "jet-together" featured incredibly scaled-out models as well as impressive sport fliers—literally, something for everyone. Our West Coast senior editor John Reid captured the action, and his detailed coverage will make you feel as if you were there on the flightline.

If you're looking for a winter building project, you won't want to miss this month's featured construction article on Mark Rittinger's Skoda-Kauba V4. This model of the early WW II fighter trainer is intended for electric power and has a 49-inch wingspan. With foam-core wing construction and a built-up fuselage, this project is intended for experienced builders.

Our review lineup includes the Gaui R5, a 140mph racing helicopter; the HobbyKing B-17, a four-motor WW II bomber; the Motion RC F-15C Fighting Falcon; the Dromida Voyager, a scale classic sport plane and trainer; the E-flite Sukhoi Su-29, a precision foam aerobat; and even an FPV camera drone, the Dromida XL 370. And with so many fantastic airplanes and great gear to look forward to, 2017 is sure to be another great year for RC. It wasn't easy, but we managed to pick more than 40 of our favorite releases to showcase in this special "Hot for 2017" feature.

We also have a how-to on making scale wing hatches; step-by-step instructions for knife-edge flight (and a variation!); advice on installing control hinges on your giant-scale plane; and a review of the new Spektrum DX6e, an inexpensive 6-channel radio with a surprising amount of programming features. This February issue, like the RC hobby itself, has a little bit of everything, and we hope that's OK with you. If it is (or isn't!), we'd like to hear from you. Drop us a line at [MAN@airage.com](mailto:MAN@airage.com) or on our Facebook page (which recently topped 700,000 likes!). We enjoy and appreciate your comments and look forward to making our 87th year of publication our best yet.

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We love hearing from our readers: Your emails, tweets, and comments quickly let us know what you'd like to see more (or less!) of in upcoming issues and online. Here's what some of you are saying about *Model Airplane News* magazine.

## Facebook Troubleshooting Gasoline Engines

OK, so you've installed your gasoline engine properly, made sure that the fuel tank is properly installed, and checked that the fuel lines and fuel filter are all hooked up correctly. But you still can't get any fire in the hole—the engine just won't start. Like any piece of equipment, you have to know the basics for your gas engine to operate properly. There is a right way and a wrong way to fire up your engine. We recently posted an engine troubleshooting guide, which offered 11 tips for getting reliable performance from your big gas burner, and many of you found it useful. Here are some of your comments.



**Fred Huber:** Properly maintained gasoline is more reliable than glow.



**Aaron Ballwich:** Gasoline engines are the best and overall cheaper than big electric motors, batteries, and chargers to fly the same-size airplane. High octane all the way!



**Carl Edward:** I was having issues with my first gas-engine-powered model—a G-38—powered PT-17—and found it very hard to start. I read your post about proper setup, and it was amazing. I got it fired up without any trouble. Thanks for the tips!

## ModelAirplaneNews.com Mixing Custom Colors

One of the trickiest jobs for any scale model builder is mixing custom colors for an RC scale project. The difference between accurate and "pretty close" can be the difference between winning and not even placing at a scale competition. After collecting the proper aircraft color and markings documentation, the biggest challenge remains accurately reproducing those scale colors.

Without the proper paint, our models won't match the documentation. There really are no catch-all formulas for mixing military or civilian colors. You can buy cans of paint labeled "Cub Yellow" or "Olive Drab," but more often than not, these premixed colors won't exactly match the shades of yellow or olive we want. We posted this article for those who are considering going that next step in scale accuracy. Here's what some of you had to say.



**Flyoz:** Genuinely interesting and helpful. Thanks.

**Rica1:** Really good for future reference!

**RB:** More to the subject than I thought. A real eye-opener.

**SC:** I have been competing in scale for several years, and this is the first article I've read that explains the subject. Can't wait to give it a try.

**JS:** A great article. Thanks.

## ✉ In Our Mailbox



### Rhinebeck Mission Event

I just finished reading your January issue, and I was extremely pleased that at the 50th-anniversary WW I Jamboree the guys at the Mid-Hudson Radio Control Society brought back the Mission event! My dad and I competed many years ago in the Mission event, and we too flew a Zirolli Taube. Are there any sources for this old airplane design?—Roger Wilcox

Roger, yes, indeed. This year's first-place Mission winner, Nick Zirolli Jr., sells plans for the 88-inch span Taube, and you can order it at [ziroligiantscaleplans.com](http://ziroligiantscaleplans.com). If you want a short kit of the Zirolli Taube, you can also get one at [lasercutsusa.com](http://lasercutsusa.com). As you might remember this is a 3-channel, easy-to-fly airplane, and it certainly made a good showing at this year's Old Rhinebeck Aerodrome. We hope this becomes a regular event at future Jamborees.—GY



### Turbine-Powered Biplane

Several years ago, I heard rumor of a biplane design that was powered by a turbine engine—a sleek, swept-wing composite jet with two sets of wings. Any chance you know more about it?—Tom Wheeler

Tom, the plane you're referring to is the Quantum, which first showed up at the 2013 Florida Jets event. Goetz Vogelsang flew this slick-looking aerobatic jet there, which is described as a "Christen Eagle on steroids."—GY



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# Tips & Tricks

USEFUL HINTS FROM MODELERS | Illustrations by Richard Thompson

## FAST WHEEL CHOCKS

To prevent my models from sliding around in the back of my SUV, I make wheel chocks from lengths of water-pipe insulation foam. They are inexpensive and each package contains enough foam tubes for several model airplanes. I cut the material about 2 inches longer than the diameter of the wheels, then I cut a horizontal slot in the side of the tube so that the model's wheels fit snugly. A sharp utility knife gets the job done in no time.

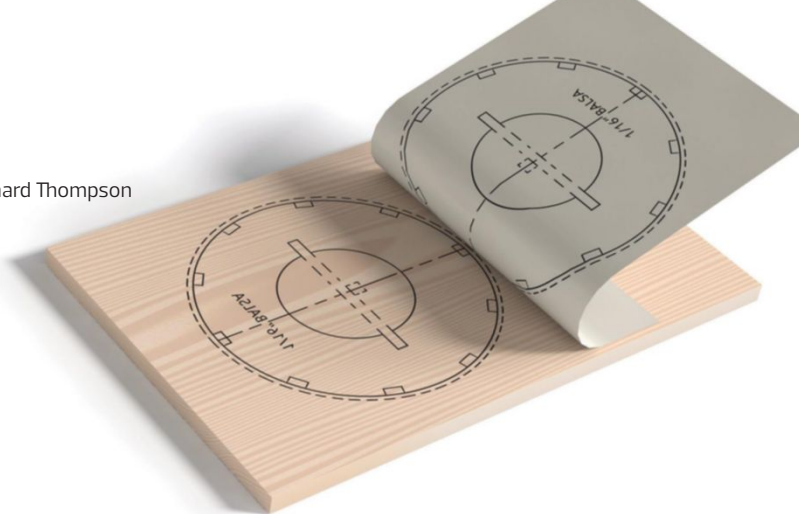
**Henry Haffke,  
Scotia, NY**



## EASY PRINT-WOOD

When building from plans, you need to transfer the paper plans' part templates to your wood so that they can be accurately cut out. Make 1:1 photocopies of all the parts, then wet the wood sheet stock with acetone using a paintbrush. Keep brushing back and forth until the wood goes from "wet" to "damp"; experience will indicate just how damp it needs to be for a perfect image transfer. Lay the photocopied template face down on the wood (pay attention to grain direction) and then press/rub it in place for a few seconds. When you peel back the paper copy, you'll have a perfect mirror image on your wood sheet stock. Once you transfer all the templates to balsa, you have, in effect, an old-fashioned "print-wood" kit, ready to be cut out and assembled.

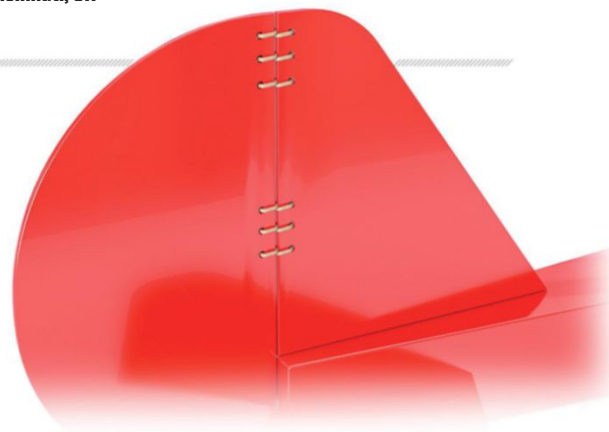
**Jim Ryan, Cincinnati, OH**



## STITCHED HINGES

To hinge solid-wood surfaces together, like on a fun-fly airplane, the baseball stitch method is quick and easy. After covering the tail surfaces, drill a set of two or three 1/16-inch holes about 1/4 inch from the edges for each hinge. They should be slightly offset for each surface. Take some Sullivan Products' yellow Kevlar pull-pull thread or strong kite string and stitch the holes together with a figure-8 pattern. Insert the thread through one hole in the fixed surface, go over the edge and down through the hinge line, then up through the matching hole in the control surface; repeat the stitching until you've stitched the two surfaces together using all the holes. Some CA in the holes will secure the threads and keep the ends of the threads hidden. Repeat for the rest of the hinges. This method is quick, inexpensive, very strong, and produces smooth, bind-free control movement.

**Rolly Siemonsen, Kingston, ON, Canada**



## INSTALLING BLIND NUTS

When installing engine mounts in a model airplane, you sometimes have to reach in the tank compartment to install blind nuts into the firewall. You can have a terrible time due to the tight access. A simple way to fix this is to smear a little petroleum jelly on your fingertip, then place the blind nut on the jelly. It holds the nut to your fingertip, and you can then reach in. After sliding the bolts into the mount holes, you can feel the protruding bolt threads, so you can gently twist the blind nut and start threading it into place. Then tighten the bolts from the outside to pull the blind nuts into place.

**Edwin Hawk, Smithville, OH**



**SEND IN YOUR IDEAS!** We want your ideas for Tips & Tricks! This month's winners will receive a *Model Airplane News* baseball cap. Send a photo or rough sketch and a brief description to [MAN@airage.com](mailto:MAN@airage.com) or *Model Airplane News*, c/o Air Age Media, 88 Danbury Rd., Wilton, CT 06897 USA.



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# Pilot Projects

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**PILOT  
PROJECT  
OF THE  
MONTH**

## JOLLY ROGERS SQUADRON T-28

**Greg Minden, Las Vegas, NV**

Inspired by the MAN E-flite Carbon-Z T-28 makeover, Greg decided to paint his in VF-84 Jolly Rogers Squadron colors. He writes, "The 3-blade Master Aircrew prop really makes a difference in the looks and gives great performance." Greg used Krylon Plastic Primer and Model Master scale paint cans.



## DENNY JR.

**Bud McClure and Peter Johnson, Stanwood, WA**

Built from 70-year-old plans, this classic model weighs in at 5 pounds and is powered by a Super Tigre electric motor turning a 12x6 prop. Bud and Peter added ailerons to the 6-foot wing. Reginald Denny, for whom the plane was named, was a Hollywood actor and model enthusiast who had a hobby shop in Los Angeles, California.



## ROYAL BARON 58

**Jeff Ziegler, Moline, IL**

This scale restoration features a dashboard with all its gauges, some seats, a pilot, hand-carved antennae, functional cowl air scoops, and Robart strut covers with Kraft wheels. Originally powered by Webra engines, the Baron now has two E-flite Power 32 motors and counter-rotating propellers. Jeff notes that it has already won first place at a contest!

## NIEUPORT 11

**Bern "Doc" Yocke, Somonauk, IL**

After building this Balsa USA kit, Doc added Solartex linen covering, decals from Kirby's Custom Graphics, Williams Brothers wheels, and Robart hinges and control horns. A Zenoah G-26 provides the power, with an optical ignition switch. Doc writes that he rigged the flying and landing wires as per Gerry Yarrish's instructions. (Photo by John Strybiak)



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# HOT FOR

## 40+ new planes & products for the new year

It should come as no surprise, but already 2017 is shaping up to be a terrific year in RC! Our editors looked at all of the new planes, drones and gear in store for the new year and then chose 40 of our favorites to showcase here. We hope this rundown gets you as excited about 2017 as we are!



### E-flite Opterra

Lightweight construction, a long 78.3-inch wingspan, and efficient aerodynamics give the Opterra a wide range of capabilities, which include everything from sport aerobatics to soaring. It can even carry a GoPro or similar camera to record HD video. Made out of Z-Foam reinforced with carbon fiber, the Bind-N-Fly version comes with a Spektrum AS3X receiver with SAFE Select flight envelope and costs \$229.99; the Plug-N-Play version costs \$199.99. [e-fliterc.com](http://e-fliterc.com)



### RealFlight X

This popular flight sim is even better than before, with upgraded graphics driven by Unigine. RealFlight X offers unbounded flying sites—like the 8 million acres in Sierra Nevada and real-life locales like Wasserkuppe in Germany and the castle in Calahorra, Spain—and more than 50 new aircraft. Drone racecourses and tier-system, gamelike challenges give you more reasons to fly than ever before. RealFlight X starts at \$99.00. [realflight.com](http://realflight.com)





# 2017

BY THE MODEL AIRPLANE NEWS CREW

## Hangar 9 Model 12 Viking

With an 89.2-inch wingspan, this built-up biplane will put on a show wherever it flies! Designed for a 100-125cc gas engine, this giant-scale aerobat delivers 3D performance and features lightweight wood construction, a painted two-piece fiberglass cowl, and painted aluminum landing gear and fiberglass wheel pants. UltraCote re-creates the stunning scale scheme, and the Model 12 Viking's hinged control surfaces and two-piece, plug-in wings make assembly easy. This beautiful biplane costs \$1,399.99.

[hangar-9.com](http://hangar-9.com)



## MaxAmps Drone Racing Battery Pack

Engineered to reduce height and increase performance for racing drones, these 4S 1850mAh LiPo packs use 12AWG Deans Ultra wire and can easily handle the large-amp draw your quad demands. Because of the lower center of gravity that this pack provides, your racer might even fly more precisely than before! It costs \$69.99.

[maxamps.com](http://maxamps.com)



## Hitec X4

This AC/DC four-port multicharger allows you to connect up to four batteries of various chemistries (NiMH, Ni-Cd, LiPo, LiFe, Li-Ion, LiHV, and Pb), with each channel performing independently. Hitec's Charge Master software even allows you to operate the charger via your personal computer or Bluetooth using a smartphone app. It costs \$199.99.

[hitecrad.com](http://hitecrad.com)



## FMS Razorback P-47

This 59-inch-span foam warbird has a ton of scale detail, including electric retracts, scaled control surfaces, landing gear covers, cockpit interior, and gun turrets. It comes with a powerful brushless power system and digital, metal-gear servos installed, and its waterbased paint scheme is designed to protect the foam parts. "Bonnie" is a great addition to any scale modeler's hangar and costs \$359.99.

[forcerc.com](http://forcerc.com)







## HobbyKing Night Walrus

This improved version of the popular glider has LED lights, so you can even fly at night. It also has a reinforced belly pan to strengthen the fuselage, an updated motor system, and additional cooling vents. This EPO foam model can be assembled quickly and only requires a 6-channel radio and receiver and a 3S 2200mAh LiPo. It costs \$136.00.

[hobbyking.com](http://hobbyking.com)



## Dromida HoverShot

Although it's less than 5 inches across, this camera drone packs a ton of tech fun! Its 720p first-person-view (FPV) camera can shoot video and photos via the DroneView app in real time, and its Altitude Hold takes the guesswork out of exact positioning so that you can frame up the perfect shot. Takeoffs and landings are as easy as pushing a button. The HoverShot comes ready to fly, offers multiple flight modes, and can fly for 7-10 minutes. It costs \$99.99.

[dromida.com](http://dromida.com)



## HobbyZone Rezo Ultra Small Quad with Camera

With a built-in camera that can record video and take still photos and with features like altitude hold and automatic takeoff and landing, this mini quad is a steal at \$39.99. The 1.8-inch-long Rezo comes ready to fly in blue, orange, red, or yellow and can even do flips at the push of a button.

[hobbyzone.com](http://hobbyzone.com)

## E-flite P-47D Razorback 1.2m

With retracts, flaps, weapon payloads, and scale markings like panel lines, engine details, and more, this Thunderbolt is sure to please any World War II enthusiast. Made out of Z-Foam, it can be assembled quickly and requires just a 6-channel radio and 3S 2200mAh LiPo flight pack. The Bind-N-Fly version comes with an AS3X receiver with optional SAFE technology and costs \$269.99; the Plug-N-Fly version is \$239.99.

[e-flite.com](http://e-flite.com)







## ProTek RC Black Label Brushless Servos

Compared to standard servos, these Black Label units operate cooler and are more efficient, and they are insanely fast. ProTek also notes that they will last longer and are nearly 20 percent more efficient than traditional servos. They feature machined-aluminum, heat-sink cases with chamfered edges and have detachable wire leads with two lead lengths to ensure clean installation and a perfect fit for your installation. They cost \$159.99.

[amainhobbies.com](http://amainhobbies.com)



## E-flite UMX A-10

The A-10 Warthog is one badass plane, and now it's available in a model with a 22-inch wingspan that you can fly nearly anywhere. AS3X flight technology combines with twin 28mm ducted fan units for fantastic maneuverability and power. This jet has full 4-channel control with dual rudders and scale details like a nose cannon, weapon pylon, and panel lines. This Bind-N-Fly aircraft costs \$149.99.

[e-flite.com](http://e-flite.com)



## Blade Theory Type W

This racing wing delivers blistering 60-90mph performance! The "FPV Equipped" version costs \$299.99 and comes with a 700TVL camera and a 200mW video transmitter, while the "FPV Ready" version costs \$219.99 and has dedicated spaces for pilots to add their own FPV equipment. Both versions come with integrated flight components, including an installed Thrust 2350Kv motor,

digital metal-gear servos, and AS3X stabilization and SAFE. Modular and easily removable wings make transport a breeze. Just add your 4S 1300mAh LiPo and one of the three decal schemes and you'll be ready to race!

[bladehelis.com](http://bladehelis.com)

## Motion RC MiG-21

This Cold War classic comes with a 80mm 12-blade ducted fan and has removable wing halves and stabilizers for easy transport. Digital metal-gear servos control the ailerons, flaps, elevators, and rudder, and an integrated circuit board simplifies wiring in the large battery bay. Retractable landing gear with durable aluminum trailing-link struts and tall foam rubber wheels make landing on short-grass fields a breeze. Note: model shown has been professionally weathered. This 6S, 4000 to 6000mAh jet costs \$269.99.

[motionrc.com](http://motionrc.com)







## Spektrum DX6e

Features like 250-model memory, built-in telemetry, wireless trainer link, and programming for planes, helicopters, sailplanes, and multirotors make this new transmitter a steal for \$149.99, or you can add an AR610 receiver to it for \$179.99. The DX6e has a patent-pending gimbal design with a spring configuration switch and cross-platform sharing with other Spektrum radios.

[spektrumrc.com](http://spektrumrc.com)



## Blade Inductrix FPV

Easy to fly (even in small spaces!) and equipped with a micro FPV system and 4.3-inch external monitor, this little drone makes first-person flight ideal for beginners. It features four electric ducted-fan rotors for smooth, quiet performance, and its durable rotor housings prevent damage when it inevitably bumps into a wall or falls into the grass. SAFE technology with self-leveling makes flying easy, and its LED orientation lights are the icing on the cake. The Bind-N-Fly version is \$99.99; the ready-to-fly is \$199.99.

[bladehelis.com](http://bladehelis.com)



## Hitec X1 Nano

Plug it in and charge! With a charge circuit power of 50 watts, this mini charging unit is easy to operate, compact, and efficient.

Select your battery type, and choose from four charge current settings with the press of a button. LED indicators show the charge status of your battery and make operation a breeze. The X1 Nano costs \$29.99.

[hitecrad.com](http://hitecrad.com)

## Force RC Yak 130

You can have this 34.6-inch-span hot-rod ready to fly in less than an hour! The plug-and-play EPO jet comes with its 70mm ducted fan and nine servos installed, and includes retracts and cockpit figures installed under the clear canopy. The Yak 130 is available in red or gray, and costs \$199.99.

[forcerc.com](http://forcerc.com)







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## RBC Kits Hawker Hurricane

This 63-inch-span kit might be just the winter building project you've been looking for. Designed for a G60 electric motor and 5S 5000mAh LiPo, the model features CNC-cut formers and ribs and a tab-lock design. It comes with rolled CAD plans, a vacuum-formed cowl, tail fairing, exhaust, wing tips, and spinner and is designed to accommodate electric retracts. The kit costs \$195.00.

[rbckits.com](http://rbckits.com)



## RISE Vusion 250 Extreme FPV Race Pack

If you'd like to join the fun of drone racing, here's an all-in-one package that makes it easy. The Vusion 250 is an injection-molded, ready-to-fly racing drone that comes with all the essential FPV equipment you'll need, including an LCD monitor, FPV goggles, and 25mW or 200mW 5.8GHz video transmitters. The 200mW transmitter version is \$349.99; the 25mW version is \$339.99.

[explore-rise.com](http://explore-rise.com)



## Freewing 90mm F-104

With details like CNC-machined landing gear with sequenced landing-gear doors, functional speed brakes, an installed LED afterburner ring, and an installed gyro flight stabilizer, this jet will impress any pilot. Freewing notes that the plane excels in scale maneuvers, stable flat passes, fast rolls, and tall loops and has a predictable glide slope for straightforward landings. This 67.7-inch-long F-104 starts at \$399.99 and is also available in a yellow paint scheme.

[motionrc.com](http://motionrc.com)

## Yuneec Breeze 4K

The Breeze is an app-operated quadcopter that can take 13MP photos and has the ability to record UHD (ultra-high-definition) 4K video. The app allows this quad to follow you around and get the ultimate selfie images. With a flying weight of just under a pound, it is designed to be compact, includes a nice carrying case with extra batteries, and is easy to take anywhere. Use one of the Breeze's five automated flight modes to capture unique shots. It costs \$499.00.

[yuneec.com](http://yuneec.com)





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## Motion RC Focke-Wulf Ta 152H

Looking for a warbird that will stand out from the crowd? This new model from Flightline RC is modeled after Kurt Tank's FW 190 Würger, one of the fastest piston-engined aircraft of WW II. Reinforced with carbon fiber, this foam model can withstand the rigors of sport flying and can be assembled in just minutes. This \$199.99 model also features split flaps and retractable gear, and can fly on a 3S or 4S 2200 to 2500mAh battery pack.

[motionrc.com](http://motionrc.com)



## GoPro Karma

This compact, folding drone can stay in the air for up to 20 minutes and features a detachable gimbal stabilizer. Karma includes a game-style controller with a flip-up touchscreen, providing complete control over the HERO5 Black as well as the ability to view a live camera feed. The pilot can buddy up with a friend by using the GoPro Passenger app; one person can pilot the Karma with the controller, while a second uses the app to monitor the camera. The Karma costs \$799.00 by itself and \$1,099.00 with a camera.

[gopro.com](http://gopro.com)



## Blade 200 S

Learn how to fly with this fixed-pitch, flybarless helicopter! Available in Bind-N-Fly (\$229.99) and ready-to-fly (\$269.99) versions, the 200 S comes with SAFE technology, so you can progress from beginner to intermediate and experienced flight modes. The 200 S also features metal-gear cyclic servos, 25-amp speed control, and brushless main and tail motors, and uses a 3S 800mAh flight pack.

[bladehelis.com](http://bladehelis.com)

## Great Planes Factor 30cc

Whether you enjoy sport flying or serious 3D, the Factor 30 has you covered. It can be powered by a 30-35cc gas engine or brushless outrunner, and features a two-piece wing with a carbon-fiber wing tube. A large, removable hatch allows easy access to the plane's interior, and the model's pull-pull rudder and separate aileron and elevator servos offer the ultimate in performance. The \$349.99 Factor 30cc comes with an aluminum spinner and fiberglass wheel pants and cowl.

[greatplanes.com](http://greatplanes.com)





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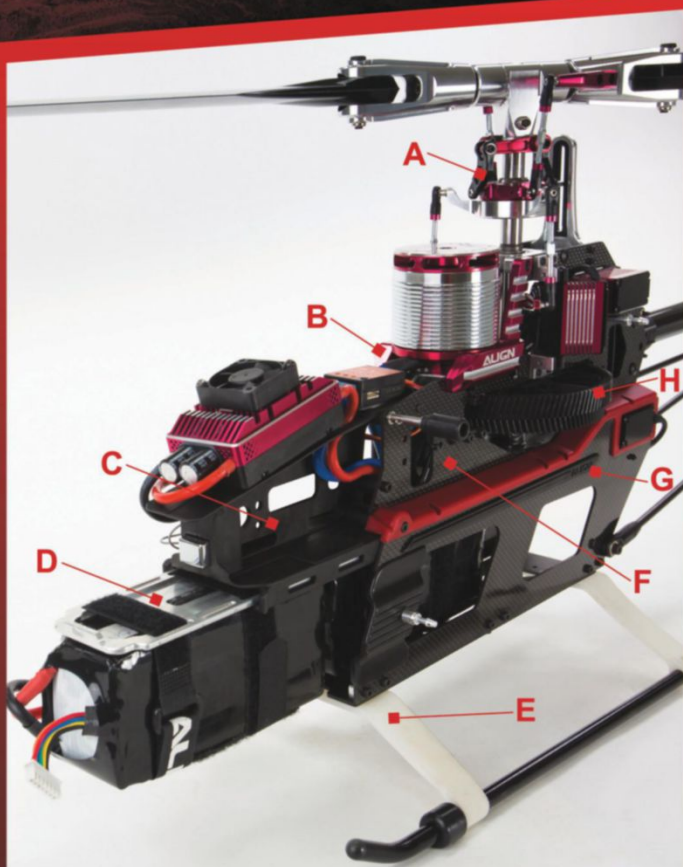
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- C. Advanced lightweight receiver mount.
- D. The CNC Aluminum Battery Mount provides great protection for the battery while providing a convenient way for mounting.
- E. Landing skid is tilted 5 degree forward which improves crashworthiness.
- F. Engineered Narrow Body Design efficiently decreases gear abrasion and machine deformation.
- G. Composite material side plates engineered by exclusive embedding technology, which strengthens the entire structure and eases serviceability.
- H. Highly enhance structural strength, effectively increase the torsional capability.

### SPECIFICATION

- Length: 1320mm
- Height: 360mm
- Width: 195mm
- Main Blade Length: 700mm
- Main Rotor Diameter: 1582mm
- Tail Rotor Diameter: 281mm
- Motor Drive Gear: 13T
- Main Drive Gear: 110T
- Autorotation Tail Drive Gear: 104T
- Tail Drive Gear: 22T
- Drive Gear Ratio: 8.46:1:4.73
- Weight(With Battery): Approx. 5100g

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## Tactic FPV Equipment

These new items are just what you need for drone racing and aerial photography. The FPV-G1 Goggles are a high-tech, low-cost way to immerse yourself in the action. The FPV-RM2 monitor has a 4.3-inch backlit color LCD screen, which gives you great picture quality. It comes with a 40-channel, 5-band 5.8GHz receiver optimized for pro FPV racing and has an auto-scan feature that makes it easy to find the clearest channel. The goggles are \$19.99; the LCD monitor and receiver package is \$74.99; and a combination of all three is \$89.99. [tacticrc.com](http://tacticrc.com)



## ICARE Bidule Tow Planes

Specifically designed for towing, this aircraft is available in three sizes that will accommodate 55cc, 111cc, and 170cc gas engines. The 170 size has such a wide speed range that it can tow 2-meter foamie sailplanes up to 60-pound, 25-foot-span giants. They cost \$845.00, \$999.00, and \$1,699.00, respectively.

[icare-icarus.com](http://icare-icarus.com)



## E-flite Convergence VTOL

This unique design gives you the best of both agility and stability. Designed by Mike McConville, this VTOL (vertical takeoff and landing) aircraft smoothly transitions between hover and forward flight, and its exclusive flight-control software makes it incredibly easy to fly. Stability and Acro modes provide a wide performance envelope. Add your FPV camera and video transmitter for the ultimate in first-person-view excitement! The 22.5-inch-span Convergence is available as a Plug-N-Play for \$219.99 and Bind-N-Fly for \$249.99.

[e-fliterc.com](http://e-fliterc.com)

## E-flite UMX Cessna 182 BNF Basic

Equipped with AS3X flight stabilization, this 25-inch-span classic flies as good as it looks. It comes with a brushless power system and radio gear installed; you just need a battery and a DSMX/DSM2-compatible transmitter. This 4.6-ounce flier looks like tons of fun! It costs \$129.99.

[e-fliterc.com](http://e-fliterc.com)



## JR XG Series Voice Upgrade

Now your XG series transmitter can talk to you with a VSpeak Voice Module, professionally installed by JR Americas. By using an additional push-button switch, adding VSpeak does not cause any loss in transmitter features or switch access. It also includes a 3.5mm stereo jack to connect the required headphones or external speaker. With just three clicks of a button, the user can adjust a variety of settings, such as Voice Style, Volume, Output Timing, and Telemetry Alarms. Users can choose to have the data announced at timed intervals, when the switch is depressed, or both. VSpeak and installation is \$99.99. [jramericas.com](http://jramericas.com)

## Blade Conspiracy 220 BNF Basic

If you're ready to join the FPV drone-racing revolution, this racer is just the ticket. The carbon-fiber frame speedster comes assembled and pretuned, and features a Spektrum FC32 Rev 6 flight controller, Thrust speed controls, and an onboard 650TVL camera and a 200mW video transmitter. You'll just need to add a flight pack and the FPV goggles of your choice, along with a DSMX/DSM2-compatible transmitter. See you at the racecourse! It costs \$349.99.

[bladehelis.com](http://bladehelis.com)





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#### **Specifications**

- Size: 280mm
- Weight w/o Battery: 405g / 14.3 oz
- Weight w/ Battery: 568g / 20.0 oz

## **Quad** **Racer280** FPV MULTIROTOR

Bring your raceway to the air with our speedy and nimble QuadRacer 280. This stylistic FPV racer is the ultimate in futuristic flying. Zip through the air with effortless precision using its included radio and LCD monitor. The clear canopy allows you to customize your racer to make it your own and compatibility with popular FPV goggles will immerse you in the driver's seat to navigate unlimited aerial freedom. The future of racing is here. The future is Hitec.

#### **Power System**

- Propeller Size: 5 x 3 in
- Motors: 2204 - 2300Kv
- Speed Control Rating: 12A Continuous, 17A Burst
- Battery: 2000mAh 3S 30C LiPo
- Flight Time: Up to 12 minutes depending on flight style

#### **FPV System**

- Video Camera: 300,000 Pixels 135° Field of View

#### **FPV Monitor**

- Type: 4.3 in TFT LCD • Resolution: 480 x 272
- Channels: 6 Programmable (DIP Switch)





## DJI Mavic Pro

The compact Mavic quadcopter is snappy and agile, and it will capture high-resolution images. It features an advanced flight-control system that draws on a host of sensors, include a ground-facing camera, ultrasound, GPS, dual redundant IMUs, and more. It will keep track of where it is flying in 3D space and even avoid collisions. DJI's GO mobile app allows for accessing settings and telemetry readout, viewing a low-latency video feed, and editing or sharing your footage. It costs \$999.00.

[dji.com](http://dji.com)

## Blade Vortex 150 BNF

This quad comes ready to race, with a custom power system, cutting-edge ImmersionRC F3 Fusion 32-bit flight-control system and full-graphic heads-up display, and a Fat Shark FlightCam with tilt adjustment. Plus, there's even a programmable LED system. Everything about this race-proven design is about one thing: speed. Add your charged 3S or 4S flight pack and bind it to your compatible radio. We'll see you at the starting line! The Blade Vortex costs \$299.99.

[bladehelis.com](http://bladehelis.com)



## FMS Beaver 2000mm PNP

The largest prop plane in the FMS lineup, this 78.7-inch EPO model flies as great as it looks. It comes with its brushless motor system and servos installed and has five LED lights for night flying. You'll just need a 6-channel radio and receiver and a 6S 4000mAh LiPo pack. Electric retracts and floats are available. The Beaver costs \$329.99.

[forcerc.com](http://forcerc.com)



## RocHobby F-16 V2 PNP

The second version of this popular 64mm F-16 has improved mechanical and structural features that enhance air performance and decrease assembly time. A fiberglass pipe adds to the wing strength for enhanced flying maneuvers, and an improved main wing set and landing-gear installation increases structural strength and reduces assembly time. The included ducted fan can produce more than 800 grams of thrust and incredible speeds. The 43.3-inch-long jet costs \$149.99.

[forcerc.com](http://forcerc.com)







## **AEROSKY DELTA** 1550mm *FLYING WING*

The Aerosky Delta Wing is constructed of tough EPO foam and finished with beautiful blue and black graphics. An 880kv out-runner motor and 40amp sky walker speed controller give this plane exceptional power to weight ratio, while digital servos provide precise controls. 3K wrapped carbon tube increases structural rigidity in the wing and are designed into the plane that allows it to break down into three pieces for easy transport.

### **SPECIFICATIONS:**

- Wing span: 1550mm(61in)
- Length: 683 mm(26.88in)
- Flying weight: 900g(31.74 oz)
- Servo: 2\*9g
- Motor: 3536-KV1200 Powerful Out runner Brushless Motor
- ESC: 40A Brushless ESC
- Prop Size: 9 inches propeller
- Battery: 11.1v(3s) 3000-6000mAh battery
- Average flight time: 25 min-40min
- Payload capacity: 1.3kg
- Maximum speed: 90 kmh
- Minimum speed: 15 kmh



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## RocHobby RC F-35 V2 PNP

Constructed out of EPO foam, this high-speed jet comes with a powerful 64mm 11-blade ducted fan that can produce up to 800 grams of thrust for scalelike speeds. Total assembly should take less than an hour, so you'll want to start charging your 35C 3S 2200mAh LiPo before you begin. This 37.8-inch-long jet costs \$149.99.

[forcerc.com](http://forcerc.com)



## Precision Aerobatics Ultimate AMR V2

It's hard to believe that Precision Aerobatics could improve its popular Ultimate AMR, but this 40-inch-span version model has even greater precision and quality, with a new color scheme, unique airfoil, upgraded hinges, and more. Weighing in at about 38.45 ounces ready to fly, this aircraft can handle even the most extreme high energy maneuvers. It costs \$249.95.

[precisionaerobatics.com](http://precisionaerobatics.com)



## Duraflly Excaltibur 1600mm

Highly compressed EPO foam construction allows this ultrathin wing glider to cut through the sky! It has a unique cantilever, forward-swept wing and V-tail, and its wing and fuselage are reinforced with carbon fiber. The \$199.99 glider comes with a brushless outrunner and servos installed.

[hobbyking.com](http://hobbyking.com)

## Blade Theory XL 5-inch FPV Frame

Ideal for drone racing, this "stretched X" design increases stability while flying fast. A durable 4mm carbon-fiber main plate offers durability and weighs less than 80 grams, and its bottom plate features designated cutouts to run the battery strap below the quad, reinforced arm tips to protect the motors in a crash, and industry-standard 30.5mm standoff cutouts to mount nearly any power-distribution board or flight controller. It costs \$89.99.

[e-fliterc.com](http://e-fliterc.com)



## E-flite UMX Yak 54 3D BNF Basic

With a flying weight of just over an ounce, this aerobat is small and light enough to fly anywhere, anytime, and its AS3X flight stabilization system means that it's easier for you to look like a pro. This 16.9-inch-span aerobat has a carbon-fiber-reinforced foam airframe and comes with its power and control systems installed. You'll just need a flight pack and a DSMX/DSM2-compatible transmitter to fly this \$99.99 aircraft.

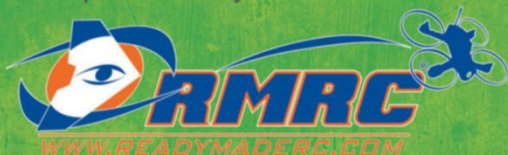
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**Robert "Red" Jensen**

Subscale UAS engineer/pilot NASA's Neil A. Armstrong Flight Research Center, Edwards CA.



### My Model Aviation Career and Journey to Inspire Others!

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**Chris Wolfe AKA The RC Geek**

BS, Embry-Riddle Aeronautical University, UAV professional, RC Jet expert.



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**This classic WW II heavy bomber is right on target!**

BY GREG GIMLICK PHOTOS BY JOHN KAUK & GREG GIMLICK



**The B-17 is one of the most recognized planes** from World War II because of its prominent role in so many Hollywood productions. With 12,071 produced and 17 of its crewmembers receiving Medals of Honor, it's no wonder that it holds such a lofty position among even non-aviation enthusiasts. The 1875mm HobbyKing B-17 is made out of EPO foam and includes everything except a receiver and flight battery. With all wiring preinstalled, assembling a four-engine bomber couldn't be easier. If you are an intermediate flier or better, this is a great introduction to multiengine scale electric flying.

This version is "Shoo Shoo Shoo Baby," a G model named after the famous Andrew Sisters' song from the '40s. If you're wondering about the third "Shoo" added to the name, it was added in 1945 when there was a change of aircraft commander. You'll see models presented in both formats.





Reviewer Greg Gimlick shows that the all-foam B-17 is a rather large model, with more than a 6-foot wingspan.

## SPECIFICATIONS

**MODEL:** 1875mm B-17 F/G Flying Fortress

(V2) PnP (Silver)

**DISTRIBUTOR:** HobbyKing ([hobbyking.com](http://hobbyking.com))

**TYPE:** Electric sport-scale multiengine bomber

**WINGSPAN:** 73.82 in.

**WING AREA:** 729 sq. in.

**WEIGHT (READY-TO-FLY):** 105 oz.

**WING LOADING:** 20.75 oz./sq. ft.

**LENGTH:** 53.15 in.

**PRICE:** \$324.99

## GEAR USED

**RADIO:** Spektrum DX9 w/ AR610 DSMX receiver ([spektrumrc.com](http://spektrumrc.com)); 9g servos (installed)

**MOTOR:** Four 40mm 850Kv brushless outrunners w/ 20-amp speed controls (installed)

**BATTERY:** Zippy Compact 25C 3S 50000mAh LiPo ([hobbyking.com](http://hobbyking.com))

**PROPS:** 9x7x3 (provided)

## HIGHLIGHTS

- Fast, easy assembly
- Retractable electric landing gear installed
- Power system and servos installed
- Easily repairable EPO foam construction





## UNIQUE FEATURES

One of the best features of this model is that the wiring for all four motors and speed controls are preinstalled in the wing. There are a lot of wires, and each is labeled with a colored tab to match a corresponding connector on the provided Y-harnesses that will go to the radio receiver. Without this feature, it would be a nightmare to wire up.

Assembly of the plane is simplified by the incorporation of tabs and matching recesses that ensure that all the tail and wing surfaces line up accurately. Once you test-fit them, you can simply glue them in place. All the control rods for the tail surfaces and steering are preinstalled. You'll want to make sure that the easy connector on the fuselage servos is secured with some thread-lock.

The landing gear is nicely done with wheels big enough to handle grass fields with ease. They also rotate up and forward, as they should. No cheating here! One of my gear legs was a bit loose in its bracket, so disassembly and addition of thread-lock to the grub screw was in order.

All the hardware is metric and included in separate bags. The decal sheets allow you to choose from a couple of variants, and there are turrets to add if you choose the G model, as I did. The hinge surfaces were already completed at the factory using hinge points, and a security check found them all to be firmly attached.

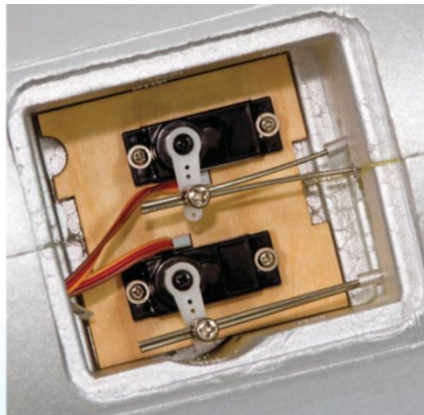
The motor mounts are preinstalled along with the speed controls and wiring. To mount the motors, you slide them into the mount until the recess is aligned with the setscrew and then tighten them up. There is a collar on the rear of the motor that will bottom out when it's properly inserted. It is highly recommended that you use thread-lock on each setscrew. Next, attach the cowl, but I caution you to check that the motor rotates freely before securing it, as a couple of mine rubbed the motor and needed to have different holes drilled for the retention screws.



The accessory package is extensive.



The Zippy 25C 3S 5000mAh battery provides plenty of power and fits nicely. It fits snugly into the nose compartment under the cockpit hatch.



The elevator and rudder servos are preinstalled in the fuselage, along with the control rods.



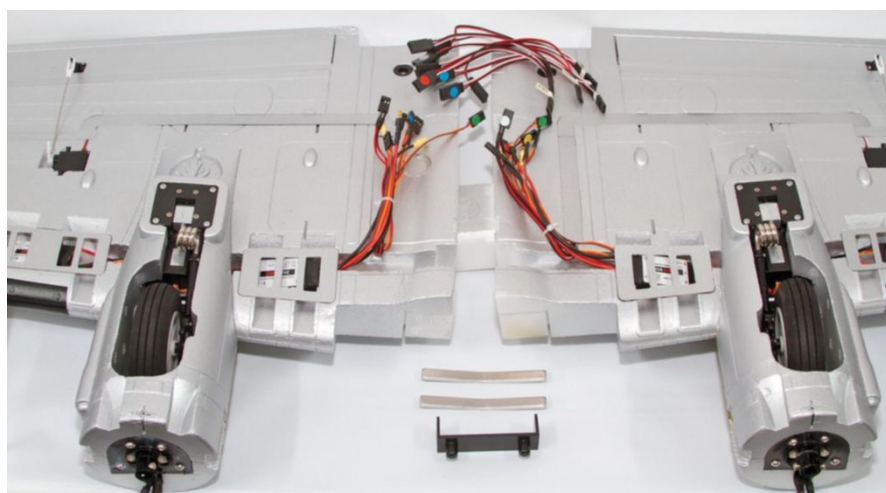
The tail surfaces align with tabs and recesses to ensure perfect alignment.





## Boeing's Flying Fortress

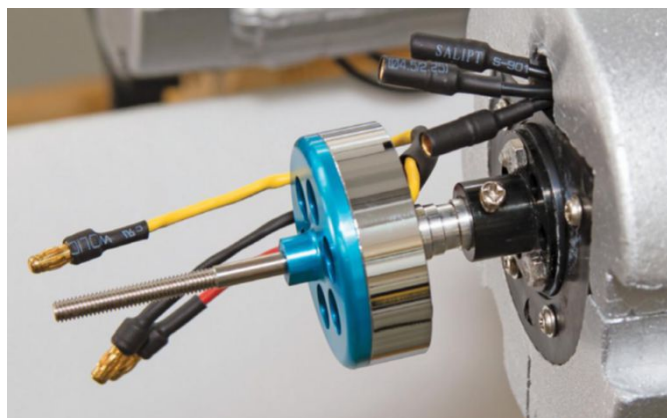
Developed by the Boeing Airplane Co. in the 1930s, the B-17 Flying Fortress was a four-engine heavy bomber that became the mainstay for U.S. Army Air Corps. Introduced in 1938, it was used throughout the Second World War through several design advancements, and was used extensively during daytime bombing raids against hundreds of German industrial and military targets. The B-17 also participated to a lesser extent in the Pacific Theater early in World War II, where it conducted raids against Japanese shipping and airfields. The prototype B-17 (Model 299) was designed by a team led by E. Gifford Emery and Edward Curtis Wells, and was built at Boeing's own expense. Some 17 variants were produced, with an overall production of more than 12,700 airframes ultimately produced. Of the 1.5 million tons of bombs dropped on German targets during the war, 640,000 tons were delivered by the Flying Fortress. As of last year, only 10 B-17s remain airworthy, none of which are combat veterans. Dozens more are on static display in various aviation museums.



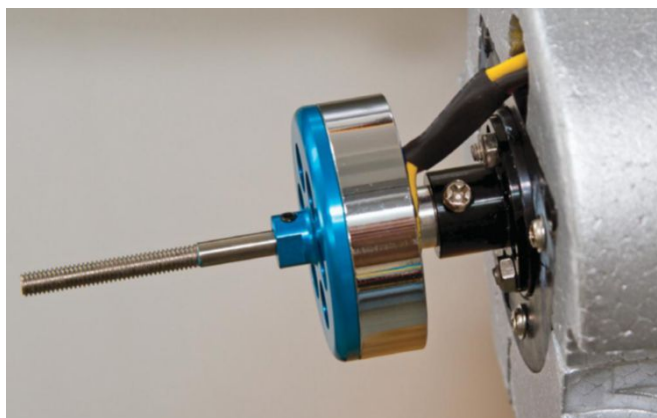
The underside of the wings show the preinstalled speed controls, along with all the wires. The metal joiners and mounting plate are shown in front of the wing.



The receiver is mounted to the wing and wires are zip-tied to keep them compact and together as they slide up into the fuselage slot.



The motors slide into the preinstalled mounts until the shoulders bottom out, and are held in place with setscrews.



The motor is secured, and the wires to the speed control slide back into the nacelle.





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# DROMIDA Voyager

**A micro sport-scale classic  
that flies like a trainer**

BY GERRY YARRISH PHOTOS BY PETER HALL

**First produced in the early 1940s**, the Voyager was a light-duty civilian single-wing airplane built by the Stinson Aircraft Company. The new micro RC Voyager from Dromida is an excellent miniature version of the full-size aircraft, and it comes out of the box 100 percent ready to fly. With its attractive paint scheme and molded-in details, the Voyager is a great way to break the old Piper Cub habit while maintaining easy, beginner-friendly flight performance. Let's take a closer look.

### UNIQUE FEATURES

Molded out of lightweight, rugged foam, the Voyager comes out of the box completely ready to fly. There is no assembly required, and the propeller and spinner are already attached to the motor. The Voyager has painted-on markings as well some stick-on vinyl decals, and it looks very scale. The landing gear also comes installed and features molded plastic fairings and wheel pants. The tires are molded out of lightweight but firm foam rubber. Small enough to transport anywhere fully assembled, it has a wing that's attached with magnets. The Voyager comes with a Dromida



The Dromida Voyager has great scale lines and is a nice micro-scale rendition of the full-size Stinson. It's ideal for flying off smooth, paved surfaces and can also be easily hand-launched from a grass field.



## SPECIFICATIONS

**MODEL:** Voyager

**MANUFACTURER:** Dromida (dromida.com)

**DISTRIBUTOR:** Hobbico (hobbico.com)

**TYPE:** Micro RC sport scale

**LENGTH:** 15 in.

**WEIGHT:** 1.9 oz.

**WINGSPAN:** 19.5 in.

**WING AREA:** 56.88 sq. in.

**WING LOADING:** 4.81 oz./sq. ft.

**PRICE:** \$89.99

## GEAR USED

**RADIO:** 4-channel SLT-compatible transmitter, onboard integrated receiver/speed control/dual servo (installed)

**BATTERY:** Flyzone 3S 11.1V LiPo flight battery (included)

## HIGHLIGHTS

- Attractive scale lines
- Easy flight performance
- Complete ready-to-fly package



4-channel Q410 2.4GHz transmitter complete with four AA batteries to power the radio and a 1S 150mAh LiPo flight battery. The radio provides throttle, rudder, and elevator control; there are no ailerons.

The charger for the LiPo battery is built into the transmitter, and there is a small covered charging dock on the back right side of the transmitter case. Simply remove the cover and slide the battery into place (the battery is

marked with an "up" decal, which should be visible when you insert the connector into the charger port). A red LED indicator will light up while charging and will go out when the charge is complete.

When it comes time to fly, simply switch on the transmitter (move the throttle to the down/off position) and connect the flight battery to the Voyager's power lead. The battery fits into the molded recess in the

model's belly and is held in place with a hook-and-loop fastener.

## IN THE AIR

Before each flight, make sure that the wing is properly attached and secured with the internal plastic tab and magnet. Attach the fully charged battery pack, and check to make sure that the controls move in the proper directions. There are small switches under a rubber cover on the



OUTDOORS, AFTER A BIT OF A DIVE TO BUILD UP SOME SPEED, YOU CAN DO A NICE BARREL ROLL.



face of the transmitter, and the control direction can be adjusted if needed. There is no need to check the balance of the model as there is only one place to install the flight battery.

**Stability:** The Voyager is very easy to fly, and the slight amount of wing dihedral provides positive flight stability.

**Tracking:** Stinsons were known for their characteristically large fins, and the model has the same scale shape of its tail. With so

much vertical area, the Voyager has great flight tracking. With its steerable tailwheel, ground handling (on a smooth surface) is also very positive. Being a 3-channel design, there is no adverse yaw created by the ailerons, so turns are very easy.

**Aerobatics:** For a 3-channel airplane (without ailerons), the Voyager has enough power for lively performance. You can loop with ease, and the model has good vertical climb performance.

Tight high-banked circles are fun, and with a little practice, you can coax a decent wingover out of this micro flier with ease. Outdoors, after a bit of a dive to build up some speed, you can also do a nice barrel roll and even a bit of inverted flight, with forward elevator stick pushed in.

**Glide and stall performance:** Weighing in at just under 2 ounces, the Voyager has an incredibly light wing loading, so it is difficult to get into



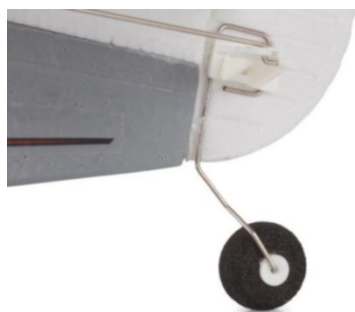
Even though it is a compact micro RC plane, it has a removable wing, which makes storage and transport a piece of cake. The wing is held in place with a plastic tab and a magnet.



## Development of the Stinson Voyager

The Voyager was first introduced as the Model 105 by Stinson in 1939. It was a 3-seater and was powered by an A75 Continental 75hp engine. The 105 was followed by the Model 10, powered with an 80hp Continental A80 engine. With a wider cabin, the Model 10 has an improved cabin interior and finish. Powered by a Franklin 4AC-99 engine, the Model 10A followed in line, with the final Model 10B being introduced with a Lycoming G0-145 engine for power. Several Model 10As went to the U.S. Army as YO-54s as observation and liaison aircraft. These were followed by the slightly larger and heavier O-62, eventually being designated as the Stinson L-5 Sentinel.

PHOTO BY AIRPLANEMART.COM



On smooth surfaces, the steerable tailwheel provides excellent ground handling.

trouble and accidentally stall the model. It glides easily with power off, and the Voyager is so docile that, even with full rudder and elevator, you get more of a spiral descent than a true spin—all good things for any beginner's airplane.

### PILOT DEBRIEFING

I flew the Voyager in a medium-size gymnasium. I was able to fly the model easily in climbing and descending circles with only throttle and rudder trim. A few clicks of trim made the orbits wider or smaller, and some minor throttle-stick adjustments kept the

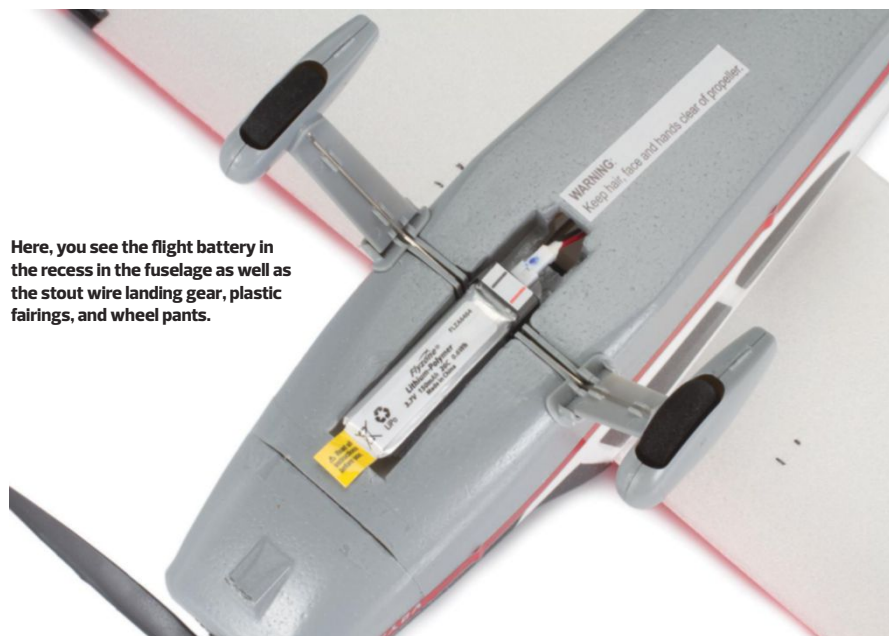
model from climbing too high. Touch-and-gos while flying figure-8s were also a lot of fun. It's a lot of low-pressure fun in a small package.

### BOTTOM LINE

Intended for beginners and first-time pilots, the Voyager is an attractive and scale-looking micro RC plane that's easy to fly. With slow and docile flight characteristics, the model is ideal for indoor flying areas and outdoor flights under calm wind conditions. If you are looking for a pilot-friendly flier for micro RC fun, the new Voyager from Dromida is an excellent choice. ✈



No need for a separate battery charger, you can recharge the flight battery with the built-in charger in the transmitter.



Here, you see the flight battery in the recess in the fuselage as well as the stout wire landing gear, plastic fairings, and wheel pants.



# Spektrum/ Horizon Hobby DX6e

## A HIGH-VALUE 6-CHANNEL RADIO AT A BUDGET PRICE

BY GERRY YARRISH

PHOTOS BY PETER HALL

How do you define value? Well, in the real world, you use a formula measuring how much you get for your money. With the new Spektrum DX6e programmable radio, the value part of the ledger is off the scale. It uses the same DSMX technology and easy-to-use AirWare programming found in the higher-priced pro-level Spektrum transmitters, and it is loaded with features simply not found in other radios in this price range. For newcomers to the hobby as well as experienced RC pilots, I think that a well-equipped 6-channel radio system is a great investment. Beginners can grow into it as their airplanes become more involved, and sport pilots will appreciate all the bells and whistles. Let's take a closer look.

### Specifications

**Model:** Spektrum DX6e

**Manufacturer:** Spektrum  
([spektrumrc.com](http://spektrumrc.com))

**Distributor:** Horizon Hobby  
([horizonhobby.com](http://horizonhobby.com))

**Model type:** Airplane/helicopter/  
sailplane/multicopter

**Modulation:** DSMX, DSM2

**Number of channels:** 6

**Band:** 2.4GHz

**Model memory:** 250

**Telemetry:** Yes

**Receiver:** AR610 (included)

**Price:** \$179.99 (\$149.99, w/o receiver)



The new DX6e from Spektrum comes with four AA batteries, a comprehensive instruction manual, and an AR610 DSMX receiver and binding plug.

### UNIQUE FEATURES

Physically, the Spektrum DX6e has an attractive appearance and feels well balanced. It has a tiltable main antenna with a convenient handhold just below and behind it, and digital trims are used all around. The familiar, easy-to-use Spektrum roller/switch is to the right of the main display screen, and two flush Clear and Back buttons for navigating the menus are to the left. The control sticks have a new gimbal design with a spring-configuration switch. This lets you change the gimbal spring configurations simply by moving the slider switch on the back of the transmitter—no tools are required. Just select the spring

configuration that matches the flight mode you are using and the model type you are flying. The four spring configurations are:

- Normal Throttle for Modes 2 and 4 (Air, Heli, and Sailplane Model Types)
- Spring-Centered Throttle for Modes 2 and 4
- Spring-Centered Throttle for Modes 1 and 3
- Normal Throttle for Modes 1 and 3 (Air, Heli, and Sailplane Model Types)

The DX6e is well laid out, and it has all the standard two- and three-position switches for mixes, auxiliary channels, and dual rate selection, and a Bind push button at the upper left. The on/off power switch is recessed. When switching off the transmitter, you depress the switch for about three seconds so that there are no accidental power





The DX6e has a familiar transmitter case layout. The top left upper corner has all the usual assignable switches and the push button for binding.



The top right upper corner has the usual aileron and elevator dual-rate switches and a two-position mix switch toward the back. On the face of the case, the dual-rate switches are two-position, while the ones on the top corners are three-position.

interruptions. A stylish neck-strap hook is integrated into the case design, but a lanyard is not included.

The screen display is the same easy-to-read layout of other Spektrum radios and includes Model Name, a Timer (activated by the throttle stick), battery-voltage icon and readout, the four main trim-position bars, a total radio on timer, and a large model-type icon. I especially like the new feature of being able to choose the type of icon you want. Under the System Setup menu, you can scroll down to the Aircraft Type submenu. This is where the wing and tail types are selected, but down in the lower right corner is the Next selection. Click there and the Aircraft Image screen is brought up. There are 37 icons to choose from and include everything from sport and scale models, to WW II warbirds,

**IT FEATURES AN SD CARD SLOT (CARD NOT INCLUDED), SO YOU CAN SHARE MODEL MEMORY SETUPS WITH JUST ABOUT ANY OTHER SPEKTRUM RADIO USER. PLUS, IT HAS AN IMPRESSIVE 250-MODEL MEMORY AND BUILT-IN TELEMETRY.**

jets, helis, quadcopters, and other multirotors. Select what you want, exit the program, and it appears on the main screen display.

The transmitter also features programming for four model types: airplane, helicopter, sailplane, and multirotor. It features an SD card slot (card not included), so you can share model memory setups with just about any other Spektrum radio user. Plus, it has an impressive 250-model memory and built-in telemetry. These features alone make it worth the price of admission, but you get a whole lot more

for your money. There's a wireless trainer link, seven airplane wing types (with six tail types), four sailplane wing types (with three tail types), and two swash types (normal and 120 degrees), for the heli pilot. For custom setups, you get seven-point throttle curves, for both airplane and helicopter programs, and seven-point pitch and tail curves for helicopters. The DX6e also has programming for custom multirotor flight-mode setups. Other airplane programming features include the standard flap system with elevator compensation, flight modes, dual rates and expo, a seven-point throttle curve, four programmable mixes, and three preset mixes: rudder-to-aileron/elevon, aileron-to-rudder, and elevator-to-rudder. Add to this the precise and smooth feeling control sticks and you have a high-value product.

The DX6e comes with four AA transmitter batteries, a complete instruction manual, and a bind plug for the AR610 DSMX receiver. If you already have a DSMX receiver, the DX6e is also available without a receiver for \$30 less.

With its 250-model memory, I especially like the way the programming makes the memory menu easy to navigate. Only the memory slots that appear are the ones that have model settings saved to it. This means that you don't have to scroll through a bunch of empty slots or move models around should you delete any.

Requiring that the telemetry-enabled receiver have a built-in telemetry function provides real-time information on assignable data, like battery voltage, signal quality, motor temperature, and more. You can also program alerts that let you know when specific telemetry values are reached or exceeded. I think this is great for keeping tabs on your receiver's voltage levels.



On the back of the case under a clear cover is the unique gimbal spring-configuration switch.





The main screen is uncrowded and easy to read. Airplane name, battery voltage, timer, aircraft type icon, and digital trim positions are all shown.



A cool feature with the DX6e is that you can select the type of aircraft icon that appears on your main screen. To get to it, go to the Function List, then to the System Setup, Aircraft Type, and select "Next" at the lower right corner of the screen. There are 37 icons to choose from.



I like the setup of the Mixing screen with the Rudder-to-Aileron/Elevator mixes set at the top. This is ideal for dialing out roll and pitch coupling.



The AR610 DSMX receiver features an active amplified antenna arrangement.

## AR610 RECEIVER

The AR610 DSMX receiver included with the DX6e features the signal security of an active amplified antenna. This antenna configuration allows the receiver to deal effectively with reflective materials on your model to avoid polarization-signal blind spots. And being amplified, the antenna works extremely well especially in noisy 2.4GHz environments, like fun-flies and other events where several airplanes are in the air at the same time. The AR610 also includes a data port for use with Spektrum telemetry modules and Flight Log signal monitors.

## BOTTOM LINE

With an attractive budget price of only \$179.99 (with receiver), the DX6e is far from being just a budget radio. It is a feature-rich 6-channel radio, and it has all the features you'd expect from a more expensive system. With amazingly easy-to-use programming and great setup flexibility, the DX6e is one of the best values you can get today. After putting it through its paces, I really like its feel and performance. If you are looking for a new 6-channel radio system, I highly recommend the DX6e. ✈



Typically your first stop after setting up servo throw settings, the Dual Rate and Expo screen is user-friendly and includes a large graphic readout showing the parameters.



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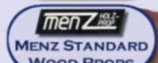
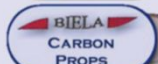
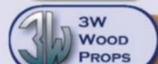


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# Best in the West Jet Rally

Outstanding jets, talented pilots,  
and four days of nonstop flying

TEXT & PHOTOS BY JOHN REID

The lineup for flight time was  
always full, but it moved quickly.





It is Monday morning, October 3, in a wide-open area just outside of Buttonwillow, California, the small, active, full-scale, uncontrolled Elk Hills-Buttonwillow runway sits there quietly, with nothing more than a bird or two flying overhead. Tomorrow, jet pilots from around the world and throughout the United States will converge on this quiet runway for one of the biggest jet events west of the Rockies. This will be the location of the 2016 Best in the West Jet Rally. Tents will start to pop up, including a large banquet tent located near the middle of the runway. Concession stands will arrive along with a number of pilots stocking up their tents in the pit area, which this year is three rows deep. All of this will turn this quiet runway, located in the middle of wide-open farmland, into a mini city. Eventually, 120 registered pilots, along with family and pit crew, will arrive, and they all have one thing in common: Each of them will bring at least one (many have more than that) RC turbine/electric-powered jet.

For the next four days, there will be no full-size aircraft at this field; all of the action will be the taking off and landing of RC turbine/electric-powered jets. The days will start early, and pilots will fly just about every type of jet, including scale, sport, foamie, civilian, military, and glider. There will be countless number of flights during the event, starting at daybreak and continuing until dusk every day during the five-day event. These guys are diehard pilots so there are no breaks in the action for lunch or a noontime demo; this is a pilot's event with nonstop flying.

At the side of the 3,265 x 50-foot paved runway, there is a six-station

CARF-Models/Elite Aerosports F-100D Super Sabre owned by Andreas Gietz makes a very nice low pass. This jet won the award for Best Markings and Paint.



pilot's area where the pilots and their spotters will stand during the flight. When one pilot lands, the pilot in the on-deck spot for that station will start up his or her aircraft, getting ready to takeoff as soon as that plane is back on the taxiway. The Bakersfield Airplane Radio Control Society (BARKS) did an outstanding job of coordinating all the airplane traffic throughout the entire event. As a result of the group's great work, there was barely a moment throughout the day when spectators couldn't look up and enjoy watching five to six aircraft in the air at any given time.

A nice-looking F-86 waiting in line for an open spot on the runway.





There were pilots who traveled great distances ... making this truly an international event.

Joe McBride and his son Tavian prepare the Mibo A-10 for one of many flights throughout the day.

### Things to Do, People to See

Pilots travel from across the country and elsewhere just to meet up with some old friends and enjoy several days of nonstop flying. Pilots traveled to the event from California, Washington, Nevada, Arizona, Texas, Utah, Illinois, New York, Florida, Colorado, Kentucky, Indiana, and Maine. Plus, there were pilots who traveled great distances, including jet pilots from Australia, Mexico, Canada, China, Germany, Venezuela, the United Kingdom, and Norway, making this truly an international event.

In addition to all the jets and flying, there were vendors on hand to offer up some product for that much-needed purchase. Some of the vendors at the event included Jet Central, CARF-Models, House of Balsa/Zap Glue, Elite Aerosports, efflux RC, and KingTech USA. Jetti paid for a vendor tent, but a hurricane in Florida meant they were unfortunately unable to make the event.



**It's a Family Thing** One of the nice things about this hobby is that it is an easy one to share with your family, and that is exactly what Joe McBride has done. Joe had his 10-year-old son Tavian with him at this year's Best in the West Jet Rally event. Tavian helped Joe prepare the A-10 Warthog for flight, wheeled it out to the runway, and then was his spotter on the flightline. The jet is a Mibo third-generation A-10 Warthog that Joe built in 2008, which has about 500 flights on it, and Joe says it has been a fantastic plane. It is powered by two JetCat P120 turbines, and guidance is with the Spektrum DX18, 18 Spektrum servos, and a receiver. It goes through about 2 gallons of fuel in about 8 minutes and travels at 140mph.



**Above:** Joe and Tavian are on the flightline, with one last check of the systems. **Right:** Here's the business end of the Mibo A-10 (Warthog).



## Formation Flying at Its Best

Two of the best formation fliers, Californians Mike Adams and Ken McSpadden of Team Viper, impressed the crowd at this year's Best in the West Jet Rally event. Having done formation flying for some time, they make this type of flying look easy. Mike and Kenny fly a matched pair of Skymaster 2.6m Viper Jets (hence the name "Team Viper"). Both are outfitted with Spektrum DX18 transmitters and 12-channel PowerSafe receivers. A JetCat P180 turbine powers each of the Vipers. The radio systems are powered with LiFe battery packs from Spektrum, and the sequencer that is built into the DX18 transmitter controls the pulsed smoke on both jets. Ken and Mike have been flying formation together for some time, and they have been flying the jets now for about three years. This year, they had a chance to compete in the team freestyle event at the Red Flag event at Paradise Field in Lakeland, Florida, and they walked away with the first-place trophy.

One of the Skymaster Viper Jets makes a perfect landing.



Kenny McSpadden and Mike Adams are in constant communication throughout the entire flight.





## Best in the West Jet Rally

### Time to Fly

The way this event works is that pilots are up in the air, then they land their aircraft, talk about the flight to some friends, fuel up, and then jump back in the line to wait for another opening on the flightline. This year's event started Wednesday morning and continued until Sunday, as long as there was enough light to fly. Having less than one plane in the air at any given time was a rare thing; these guys came to fly, and many of them used up all of their jet fuel during those five days. Fortunately for those people, the sponsors of the event came well equipped with extra fuel and smoke oil.

Spectators and pilots were treated to some close warbird formation flying by Mike Adams and Kenny McSpadden, who both flew a SkyMaster Viper Jet. These guys got quite close on all their flights; even their smoke was synchronized, by having an extra receiver in one plane that was triggered by the pilot of the first



Wayne Layne called for Brian O'Meara during the flight of the Airworld F-104.

Airworld F-104, flown by Brian O'Meara, comes in for a landing after another successful flight.



aircraft. This simple but great idea allowed the smoke to start and stop from both planes at the exact same time. This truly synchronized performance, in addition to the outstanding flying, was very enjoyable for the crowd.

One of the things that many pilots like about the Best in the West Jet Rally is that they really get some bang for their buck. The pilot's fee is \$60, and they get five days of flying, Taco Night on Thursday, a free Friday night pilots' dinner, a free T-shirt, a crew pass, and RV parking. The banquet dinner was on Saturday night, when all the awards were handed out—36 awards in total (see the sidebar for a list of the winners). All the nighttime activities were in a large 70 x 80-foot tent, with so many pilots and pit crew that they might have to think about erecting a larger tent next year.



Executing a perfect landing, this F9F Cougar was built by Tron Hammerstad from Norway, and it took the award for Best Craftsmanship.



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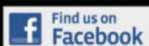
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## 2016 BEST IN THE WEST AWARDS

Award	Pilot	Airplane
Best Turbine Jet	Scott Marr	Airworld F-104
Best Military Jet	Brian O'Meara	Airworld F-104
Best Military Jet Runner-Up	Andreas Gietz	CARF-Models F-100D
Best Military Jet Runner-Up, 3rd	Brian Warner	BVM F-16 1/5
Best Sport Jet	Scott Marr	Shockwave, Custom Painted
Best Sport Jet Runner-Up	Darin Pierce	Paritech Natrix
Best Sport Jet Runner Up, 3rd	Dave Magoo	Elite Aerosports, Shockwave
Best Civilian Jet	Lowell Wexler	FEJ Lear Jet
Best Electric Jet	David Shoffner	BVM MiG-15
Best International Pilot	Azza Stephens	
Best Formation Flight	Kenny McSpadden, Mike Adams	Skymaster Viper Jets
Best Foamie Jet	Steve Kottman	Foamie F-16
Best Markings and Paint	Ralle Schneider	CARF-Models F-100D
Best Craftsmanship	Trond Hammerstad	Airworld F-104, Cougar
Technical Achievement	Andreas Gietz	CARF-Models B-2 Bomber
Best Military Jet Performance	Brian O'Meara	Airworld F-104
Best Military Performance Runner-Up	Marc Froen	CARF-Models Su-27
Best Military Performance Runner-Up, 3rd	Tyson Dodd	Skymaster F-104
Best Sport Jet Performance	Joey Tamez	Redwings, Leonardo
Best Sport Jet Performance Runner-Up	Doug Anderson	Boomerang Jets Turbinator
Best Sport Jet Performance Runner-Up, 3rd	Paul Uriarte	Ultimatum
Best Electric Jet Performance	Rich Pandis	A-10
Most Jet Flights (Sport or Scale)	Chris Patterson, Frank Migliaccio	L-39, Sprint
Most Outstanding Flight (Sport)	Azza Stephens	Shockwave, Leonardo
Most Outstanding Flight (Scale)	Ali Machinchy	Jet Legend Yak-130
Rookie of the Year	Arthur Gambino, Sam Garcia	
Special Recognition	Joe McBride	Mibo A-10
Special Recognition	Gonzalo Martinez	Skymaster A-10
Special Recognition	Patrick Richards	
Special Recognition	Team Australia	
Special Recognition	James Lashmet	
Special Recognition	Dave Coolidge	
Special Recognition	Corney McGuinness	
Colonel Robert Thacker Award	David Shoffner	

## SPONSOR RECOGNITION

**As with all good things, it takes money to make it happen—and this event is no exception. Many thanks to the sponsors who contributed to help create such an enjoyable five days.**

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Jobe Carbajal  
Kentucky Jets  
Neil Smiley  
Boomerang Jets



**Lowell Wexler works on the FEJ Lear Jet while a curious onlooker asks questions.**

## Time to Pack Up

By Sunday afternoon, many of the pilots and aircraft were all packed up and heading for home. But one thing is for sure; over the five days, all pilots were able to get in as many flights as they wanted—which is why this was an outstanding event. The Best in the West Jet Rally is a well-organized and well-executed event, and contest director Joe Castelao and his crew deserve all the credit for this—they did an outstanding job. If you are into jets, enjoy watching people flying jets, or are thinking about getting a jet, this is the event for you. The Best in the West Jet Rally really lives up to its name and is one of the best events out there. ✈

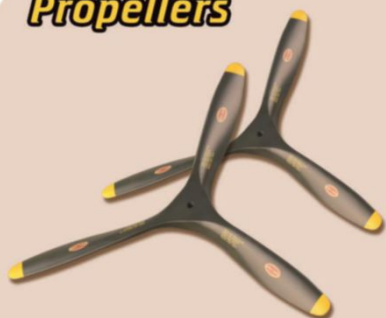


**The Australian group discusses the last flight. From left to right are Kevin Dodd, Tyson Dodd, Peter Goldsmith, and Jan Roestorf.**



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# Flight Test





# E-FLITE/HORIZON HOBBY Sukhoi Su-29mm Gen 2 BNF Basic

**From pattern performance to all-out 3D,  
this aerobat can do it all**

BY RICK BELL PHOTOS BY PETER HALL

**The Sukhoi aerobatic** line of aircraft has a big following in full-scale aerobatics circles as does E-flite's RC version of the plane. With its quick acceleration, high rate of climb, excellent controllability, and high G-load rating, the Sukhoi is well known for its aerobatic prowess.

Designed by world-class pilot, Mike McConville, the new E-flite Sukhoi Su-29mm Gen 2 has some major improvements over the original outstanding model. A lot of pilots loved the first E-flite Sukhoi but wanted to be able to tweak the model's flying characteristics to their liking. The programming in the receiver in the first generation of the plane was locked and, thus, limited this ability. E-flite took this feedback to heart. I was happy to learn that the Sukhoi comes with a Spektrum AR636A receiver with optional SAFE (sensor-assisted flight envelope) Panic Recovery, and the receiver is now programmable! Let's take a closer look.

## SPECIFICATIONS

**MODEL:** Sukhoi Su-29mm Gen 2 BNF Basic  
**MANUFACTURER:** E-flite (e-fliterc.com)  
**DISTRIBUTOR:** Horizon Hobby (horizonhobby.com)  
**WINGSPAN:** 44 in.  
**WING AREA:** 403 sq. in.  
**WEIGHT:** 40.6 oz.  
**WING LOADING:** 14.5 oz./sq. ft.  
**LENGTH:** 43.2 in.  
**RADIO REQ'D:** 6-channel DSM2/DSMX-compatible  
**PRICE:** \$229.99

## GEAR USED

**RADIO:** Spektrum DX9 and four EFLR7155 13g digital micro servos (installed)  
**MOTOR:** 10-size brushless 1250Kv w/ 40-amp speed control (installed)  
**BATTERY:** E-flite 30C 3S 2200mAh LiPo  
**PROPELLER:** 12x4 2-blade (installed)

## HIGHLIGHTS

- Easy final assembly
- Molded-in vortex generators for enhanced performance
- Optional SAFE technology with Panic Recovery
- Lots of fun to fly!





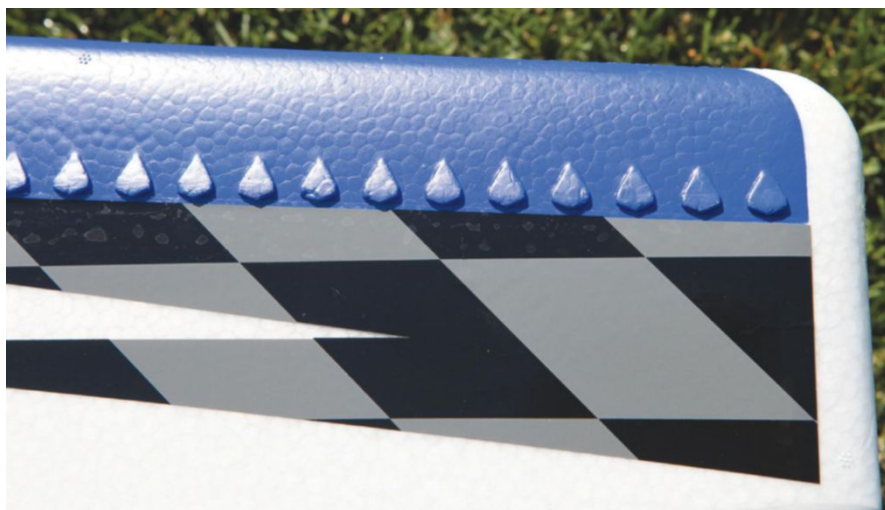
## UNIQUE FEATURES

Lightweight and constructed out of durable Z-Foam and combined with a powerful brushless motor, the Sukhoi Su-29mm is an awesome aerobatic model. For the BNF version of the Sukhoi, all you need to complete the model is a full-range 6-channel DSM2/DSMX-compatible transmitter and a 30C 3S 2200mAh LiPo battery. All the servos, motor, propeller, and spinner are factory installed, so all you need to do is install the landing gear, stabilizer, wing panels, and pushrods. The well-illustrated manual clearly shows to which output holes on the servo arms and control horns the pushrods are attached. Ball links are used on the control horns for precise and slop-free control. The wing panels slide onto a wing tube, and a screw on each side secures the wing panel to the wing tube. The stabilizers use the same arrangement; however, the stab panels are secured with some clear tape, but there's no need to worry about them coming off in flight. When adjusting the pushrods to length, you need to power up the receiver to center the servos. The canopy uses a slick-working push-to-release latch system that keeps the canopy in place. Overall, it only takes about half an hour to completely assemble the plane for flight.

The Gen 2 version of the Sukhoi also has some improvements to make the plane a better flying model. The wing is a hollow molded structure, with molded-in ribs and other structures that make it lighter and stiffer than a solid molded wing. Also new are the molded-in vortex generators on the top and bottom of the wing. These help keep the wing flying at slow speeds and during high-alpha maneuvers to help minimize wing rocking. There's also a "T strip" molded onto the trailing edge of the rudder. This increases the rudder effectiveness while adding damping to the rudder to keep the model on track in yaw. While not huge improvements by themselves, added up, they make for a better-flying plane than before.

## IN THE AIR

Being that the full-scale Sukhoi is a thoroughbred aerobatic aircraft that translates very well into any-size RC model, I knew that this version of the E-flite Sukhoi was going to be of lot of fun to put to the test. The powerful brushless motor mated to the 12x4 prop gets the Sukhoi in the air in a big hurry, and there's practically unlimited vertical performance, with an immense roll rate on high rates. Landings are super easy, but I do recommend that you use low rates for the ailerons and elevator for smooth approaches; a little throttle is needed at touchdown. Most flying is done at half throttle—except when you really want to cut loose, which the Sukhoi just begs for! The recommended center of gravity (CG) is a good starting point, but I found that the model does 3D maneuvers better with the CG set a little farther back.



The molded-in vortex generators do a great job of keeping the wing flying during low speeds and during high-angle-of-attack maneuvers. They're also molded on the bottom of the wing.



All control surfaces use ball links for slop-free control inputs. The tailwheel assembly is very robust.

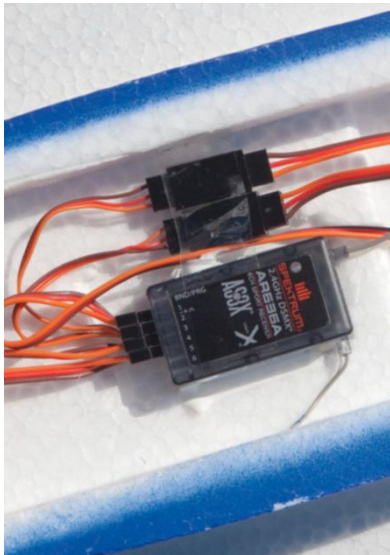


The main landing gear has been beefed up and can take a lot of abuse.



The canopy hatch uses a tab at the front and this easy-to-use, push-to-release latch at the rear of the hatch.





## Receiver Programming

As mentioned, the preprogrammed flight modes are gone, and they have been replaced with programmable AS3X and optional SAFE Panic Recovery. The manual goes into a lot of detail on how to bind the receiver with SAFE active or not. I played with SAFE active a lot and found that it's very easy to bind and use. To activate SAFE, there's a major difference in how you bind the receiver to your transmitter. For normal receiver operation, you insert the bind plug into the bind port of the receiver, power up the receiver, and turn on the transmitter in Bind mode. Once the bind is complete, you remove the bind plug and you're done. To activate SAFE, you insert the bind plug and power up the receiver as normal; however, before turning on the transmitter in Bind mode, you remove the bind plug from the receiver. You then turn on the transmitter in Bind mode. The control surfaces will cycle twice to show you that SAFE is active. You then need to assign a button switch in the transmitter to use SAFE. Pretty simple and easy to do.

Also the AS3X receiver has only one set of gains preprogrammed to make the plane feel really solid. Some pilots, however, like a higher gain setting for slow 3D maneuvers. You can easily do this by plugging in the iOS, Android, or PC app and change any of the parameters to get the performance you want. You can also easily program dual rates and expo in the transmitter instead of programming through the receiver—a very good move!



### GENERAL FLIGHT PERFORMANCE

**Stability:** The Su-29 has very good stability for a highly aerobatic model. Usually the two parameters don't enhance each other, but it is not the case here. The control surfaces are effective and have a lot of authority for exhilarating aerobatics. Inverted flight is easy to do, and it's fun to do all upright maneuvers inverted!

**Tracking:** The Su-29 tracks well for its size and light weight; it feels like a larger model in flight. With the AS3X, the Sukhoi laughs at any wind, so your flights aren't limited to just calm or light-breeze days.

**Aerobatics:** The Sukhoi likes to be pushed to the limit! I didn't find any faults doing 3D extreme maneuvers, except that the plane requires a fair amount of cross-controlling of aileron and elevator to perform flat turns. If you're not used to using extreme control throws, the low rates are pretty comfortable; I did increase the expo slightly, though. The Sukhoi is a great platform for learning basic aerobatics or for stepping into 3D.

**Glide and stall performance:** The Su-29 glides well and is pretty solid. As with any model in glide, keep the nose pointed slightly down to prevent stalls, and you'll need to apply a little throttle just

before touchdown to prevent the plane from dropping onto the runway. Here's where the molded-in vortex generators on the wing really shine, as they channel passing air over and under the wing to help keep the ailerons effective in all flight modes.

### PILOT DEBRIEFING

Lightweight and durable, the E-flite Sukhoi Su-29mm is a fun plane that will suit many flying styles. The AS3X system gives the model a really locked-in and solid feel in the air. If this is your first true 3D plane, the SAFE Panic Recovery mode allows you to try 3D maneuvers without worry as it has the ability to restore the plane to level flight with the press of a button.

### BOTTOM LINE

I really like the E-flite Sukhoi for a number of reasons, but mostly for its aerobatic dexterity. At the flip of a switch, you can have pattern-type performance turn into an all-out 3D giant—and one that doesn't break the bank! I've let a couple of inexperienced pilots try their hand at some 3D maneuvers and when they got jammed up, the SAFE mode recovered the plane each time without issue. It's the closest thing to having a crashproof model! ±



# MOTION RC Freewing F-15C Eagle

**Fly the McDonnell Douglas Desert Dominator**

BY MIKE GANTT PHOTOS BY JOHN REID

**While many of us** might not be able to own a multimillion-dollar fighter jet, Motion RC has one that looks great and doesn't require such an investment. Constructed of EPO (expanded polyolefin) foam and decorated to the hilt, the Freewing F-15 is offered as a "Super Scale" model with scores of features and minimal requirements.







## SPECIFICATIONS

**MODEL:** F-15C Eagle

**MANUFACTURER:** Freewing ([sz-freewing.com](http://sz-freewing.com))

**DISTRIBUTOR:** Motion RC ([motionrc.com](http://motionrc.com))

**TYPE:** Foam EDF jet fighter

**LENGTH:** 57.08 in.

**WINGSPAN:** 37.9 in.

**WING AREA:** 495 sq. in.

**WEIGHT:** 128.8 oz.

**WING LOADING:** 37.5 oz./sq. ft.

**MOTOR INCL'D:** Brushless outrunner

**RADIO REQ'D:** 7+channel

**PRICE:** \$500

## GEAR USED

**RADIO:** Spektrum DX18G2 w/ AR7000 receiver ([spektrumrc.com](http://spektrumrc.com)); servos installed

**MOTOR:** Freewing 3748-1550Kv brushless outrunner; Hobbywing 130A speed control (installed)

**BATTERY:** Admiral 50C 6S 5000mAh LiPo ([motionrc.com](http://motionrc.com))

## HIGHLIGHTS

- Highly detailed
- Excellent flight envelope
- No guesswork; all inclusive
- Minimal assembly required

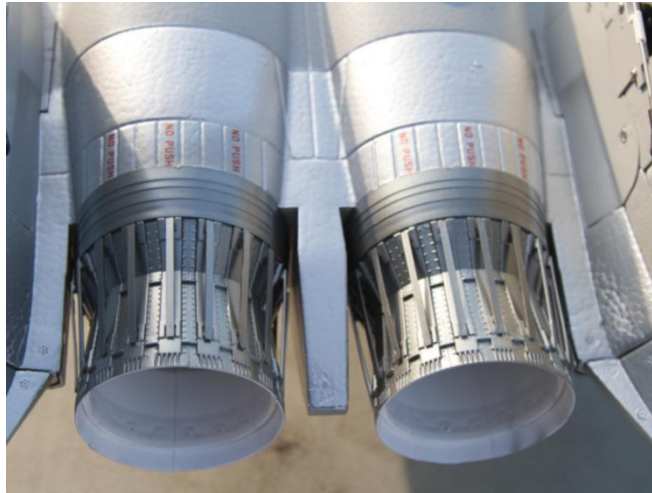


## UNIQUE FEATURES

At first glance, this F-15C Eagle looks striking with well-applied paintwork and factory-applied waterslide decals, both of which highlight that the plane is modeled after the "Gulf Spirit" livery. The big "glass" cockpit has a well-detailed pilot bust, including an "ejection seat" and instrument panel preinstalled. The rear end of the fighter has hot-looking exhaust-nozzle details, which look fantastic and also arrive to you preassembled. More scale additions are included in the form of a Vulcan cannon, antennae and Pitot tube, ECM blisters, and realistic intake details. I could go on about the scale features here but would rather tell you about some of the functions, too. There are a dozen actuators (included), which operate the standard flight controls such as roll, pitch, and yaw. Then there are flaps, an air brake, retractable landing gear, and sequenced landing-gear doors. Instead of quickly operating and slamming up and down, the gear actuates slowly and scalelike, which looks cool in flight. Bright LEDs are included and installed, and include a landing light on the front strut. These shock-absorbing aluminum gear struts have metal trunnions, and make the landing-gear system quite durable and short-grass sorties doable. The aforementioned lighting shows up well during the day but will likely make you head out early for dawn patrol. All servo connection



**Above:** It's tight, but there is enough room for a flight pack and receiver. The magnets and latch keep the canopy on well.



**Left:** The business end of the F-15 sounds as sweet as it looks. The exhaust detail is incredible.



## A WINNING DESIGN

In September 1968, a request for proposals was sent out to the major American aerospace companies. Requirements called for a single-seat fighter aircraft with a maximum takeoff weight of 40,000 pounds. It was to be designed and built for air-to-air situations, and it needed to be able to achieve a maximum speed of Mach 2.5 and also have a thrust-to-weight ratio of nearly 1:1. Fairchild Republic, North American Rockwell, and McDonnell Douglas were selected to offer their designs and definitions. These companies submitted their technical proposals, and the Air Force announced on December 23, 1969, that McDonnell Douglas would be "the one." Its winning design—a twin-tailed, fixed-wing aircraft named the "F-15"—is one of the best-looking airplanes in existence. Despite being born in the '70s, it is still regarded as one of the best-flying and best-achieving aircraft in history. The high thrust-to-weight ratio and low wing loading allow the plane to turn tightly without losing speed, which demonstrates its awesome advantage in dogfights. This jet is also known for being among the most successful fighter airplanes ever, with more than 100 victories and no losses in aerial combat.



An actuating air brake, well-applied paint job, and cool-looking cockpit give the model a realistic feel.



A bright landing light and spring-loaded nose gear keep landings in line.



The paint and detail work are excellent.



It was smart to magnetize the narrow nose, which will try to break away instead of snapping off and creating a glue joint.

points are the standard three-wire type and are clearly labeled, while the LED lighting wire ends are two-prong and simply plug into one another. A total of 14 fasteners are employed for final assembly, and there are reinforcements for the wings and elevators, which will help during high-G maneuvers. A single 90mm electric ducted fan system is used to power the plane, and before everyone cries foul, just know that a single 90mm fan is much more efficient than a twin 70mm setup. The fan housing/shroud is made out of metal, and the composite impeller inside has 12 blades. Said power system is coupled with a 130-amp speed control, which offers headroom and uses an 8-amp UBEC for guidance power. All you'll need to get the F-15 flying is your 7- (or more) channel transmitter and receiver along with a 6-cell 5000mAh LiPo flight pack. As typical with jet-fighter aircraft, the interior room is cramped but everything fits just fine. I'll add that the canopy hatch is fairly sized and is held in place with magnets and a mechanical latch.

## IN THE AIR

Having the flaps operate from a three-position switch allows the pilot to use takeoff flaps, landing flaps, or full flaps with the air brake. Since we're using 7 channels, we can use a mix to

engage the brake with the flaps when position 3 (full flaps, in this case) is selected. The optional flap takeoffs are much shorter than flapless departures, but aside from that, the results are similar in that the plane gets up in the air efficiently. Climbouts are solid, and that means the included 6-cell power system is well matched to the model. When it's time for the mandatory landing, it is a good idea to fly the jet all the way back to the ground while using the elevator to control speed and the ailerons to keep the wings level. There are no surprises, and I was impressed with the plane as it is quite forgiving in the landing pattern.

## GENERAL FLIGHT PERFORMANCE

**Stability:** Very solid in the air and on the ground, the F-15 does a great job and made me feel at ease immediately. Just remember that when landing to allow the plane to slow down before making your turn back to pit row. Your wingtips will thank you.

**Tracking:** A few clicks of trim were needed to make the plane fly across the sky straight, level, and with no flight path deviations. Tracking through scale maneuvers looked and felt perfect, with no signs of wandering.

**Aerobatics:** All scale aerobatics can be achieved. As mentioned, the high-performance power

setup will give you bigger loops and more climb, but the version I tested did very well. Inverted flight, loops, and rolls all look sweet, and it's hard to not hear the *Top Gun* soundtrack in your head while flying.

**Glide and stall performance:** Stalls are soft and very easy to fly out of. The nose will drop and the plane starts to feel a little mushy in the controls, but nothing scary happens. That said, I wouldn't recommend testing the plane's stall attributes down low!

## PILOT DEBRIEFING

Fast to assemble and quick in flight, this F-15 is not only fun to buzz the tower with but also nice to look at. The model's outline and finish is well done, with good attention to detail and will definitely garner attention at the field.

## BOTTOM LINE

Motion RC got together with Freewing, and they have produced a very inclusive and easy-to-set-up EDF jet fighter that offers a myriad of scale features and flies extremely well. With all that is completed at the factory and with its generous flight envelope, the F-15 is a winner. It is hard to tell that the plane is made out of foam when it blows by at more than 90mph, and it even looks convincing just sitting on the tarmac. ✈





# CONSTRUCTION

BY MARK RITTINGER PHOTOS BY JOHN KAUK & MARK RITTINGER

The Skoda-Kauba V4 is a unique design. Here, the airplane was photographed by John Kauk at the 2016 Mid-America electric RC event.



## Skoda-Kauba V4

### An early WW II fighter trainer you can build

**A**s a builder and model designer, I'm always on the lookout for new scale birds that have nice lines, good moments, and an interesting history. My latest search uncovered the little-known WW II-era Skoda-Kauba (S-K) series of aircraft. Of all the aircraft produced in the series, the V4 had great possibility for a sport-scale RC model.

The model translated into a very good flier, and performed well enough to garner two Contest Director's Choice awards at the 2016 Mid-America electric RC event. Whenever Ken Myers or Keith Shaw gives an award, the model has to be a winner!

#### THE MODEL

I chose a 49-inch span so that the builder can use stock 48-inch wood for the wing. In addition, this keeps the project affordable at 1/6 scale. It also performs great with lower-cost power system setups. I'm using an E-flite Power 32 brushless motor, and I use half power most of the time. I have no doubt that the smaller Power 25 motor would also work very nicely. Initially, I built the wing with retracts in mind, but it soon became apparent that retracts strong enough for a model of this size were too large to fit the wing. For this reason, I eliminated the gear. The model can be hand-launched, or you can use a takeoff dolly to get it into the air.

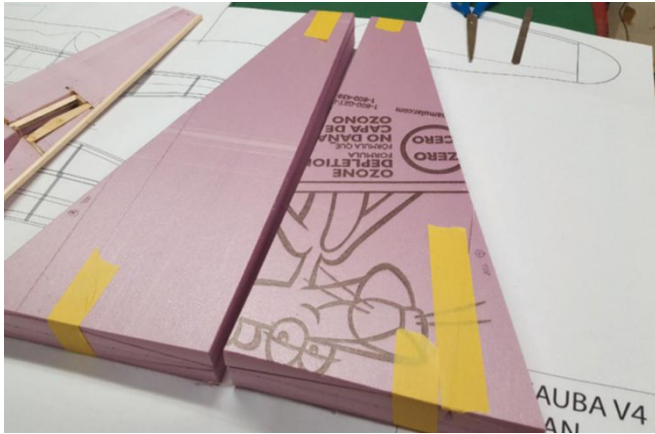
Parts are shown on the plans for the retracts that I tried, but they would require some additional work to make fit; you're on your own if you insist on retractable gear.

Because this is not a beginner's airplane, I will limit myself to a discussion of the important and unique parts of the model's construction. You should have some scratch-building experience if you attempt to build the Skoda-Kauba V4. She performs great in the air but requires constant attention. If you've flown some faster warbird types, you should be OK as it was originally designed to train fighter pilots.

#### THE WING

The wing features foam cores covered in 1/16-inch balsa. It has a 4% airfoil camber, so it's nearly a symmetrical section. Construction is straightforward, with the exception of the handholds in the center section. Cut the foam wing cores (I use pink foam) using the templates shown on the plans. Cut them with





The wings are built with foam cores. I use pink insulation foam and cut them with the hot-wire technique. The templates for the root and tip airfoils are printed on the plans.



Here, the two wing panels have been sheeted with balsa. Notice the plywood joiner sticking out of the right panel.

2 inches of dihedral and 1/8 inch of washout per tip. Carefully cut out the handhold portions and the servo wells, and notch the cores for the plywood spar. Sheet the wings top and bottom, then cut (drill) the servo wire troughs with a 1/2-inch aluminum tube. Attach the trailing edges and glue the two panels together, then add the plywood leading edge at the center of the wing. Wrap the centerline with fiberglass cloth and resin. Cut the ailerons free of the wing, then face them and the wing accordingly with balsa sheet. Add the wingtips, with the grain running spanwise root to tip, then sheet the inside of the handhold wells with balsa.

### THE FUSELAGE

The fuselage is all balsa and aircraft plywood construction, with the framework built upside down on the board. It is then sheeted or planked. It's not super complicated but requires attention to avoid twisting it out of alignment during sheeting. Also, all the stringers and longerons must be closely matched in grain stiffness to avoid twisting issues. I used medium-grain balsa throughout.

Using the 1/4-inch-square longerons as a starting point, build the basic framework upside down on the board. After installing formers and bulkheads F1 through F4 and F6

through F9, add the 1/4-inch-square stingers and the 3/8-inch-triangle stock. Remove the framework from the board, and bevel the top longerons to match the fuselage contour. Pin it back onto the building board, and use light- to medium-grain 1/8-inch balsa to sheet the sides. The actual side pattern toward the nose is shown as a dotted line on the plan side view. Some trimming is needed to get it perfect.

Remove the fuselage from the board again, add the top turtle-deck formers, and then sheet or plank that area. Add the stabilizer mount block at the rear of fuselage, then cut and sand it to shape. Add the nose block and



The model is a moderate size, making it easy to transport in one piece.

### Specifications

**Model:** Skoda-Kauba V4  
**Type:** Sport-scale WW II fighter trainer  
**Wingspan:** 49 in.  
**Wing area:** 380 sq. in.  
**Weight:** 52 oz.  
**Wing loading:** 19.7 oz./sq. ft.  
**Radio req'd:** 4-channel  
**Motor req'd:** 25- to 32-size brushless motor

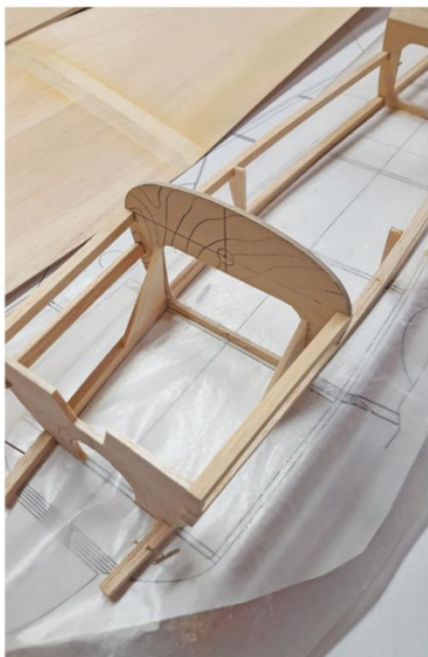
### Control Throws

**Elevator:** Low rate-5/32 inch up/down; high rate-1/4 inch up/down  
**Rudder:** Low rate-3/4 inch left/right; high rate-1 inch left/right  
**Ailerons (at root):** Low rate-1/4-inch up/down; high rate-5/16-inch up/down

### Gear Used

**Radio:** Hitec Eclipse 7 Pro transmitter, Optima receiver, four HS-65 HB servos (hitecrd.com)  
**Motor:** E-flite Power 32 brushless w/ E-flite Pro 60-amp speed control (e-fliterc.com)  
**Battery:** Pulse 4S 2250mAh LiPo (taildraggerrc.com)  
**Propeller:** APC 11x8 E-prop (apcprop.com)

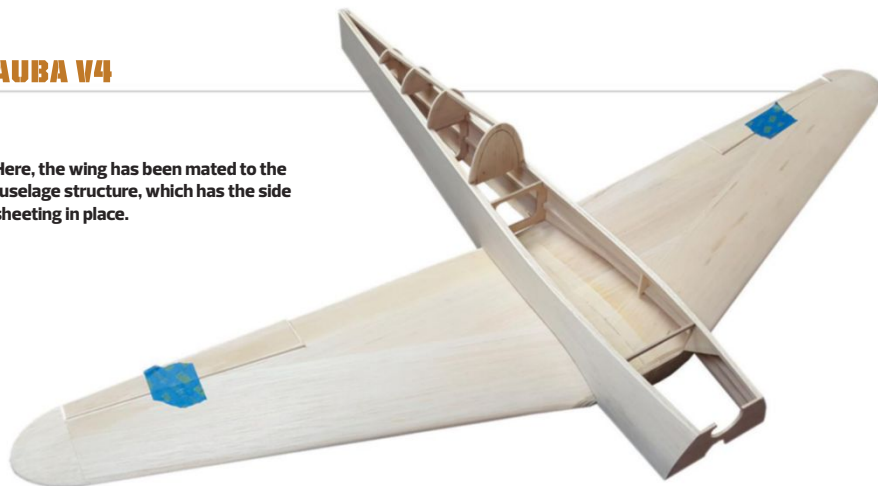




Make sure to install the formers and bulkheads properly. The firewall must be installed with side- and down-thrust offsets.

install the firewall, with 2 degrees of right thrust and 1 degree of down thrust. Now sheet the bottom rear of the fuselage. Cut and install the 1/4-inch plywood wing mount plate, and fit the wing into the saddle section with 1 degree of positive incidence. Drill the dowel hole in the wing, then add the lower front block and fit the wing in place in order to drill the two holes for the 1/4-20 wing hold-down bolts. Install the wing, and build the lower belly pan under the

Here, the wing has been mated to the fuselage structure, which has the side sheeting in place.



After the sides are sheeted, you add the turtle-deck formers to the top aft part of the fuselage and then add the sheeting.

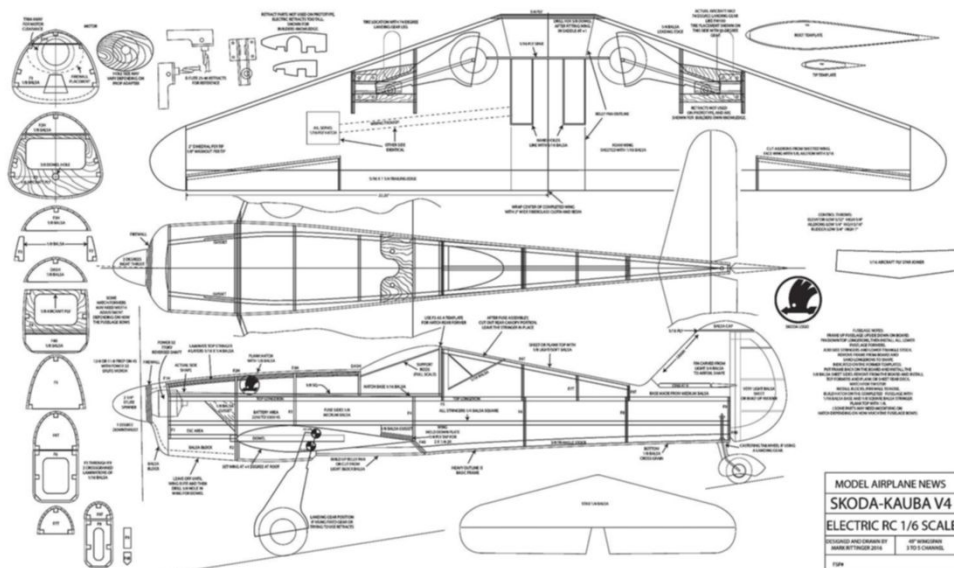


wing. Sand everything to shape, cut out the rear windows, and start building the hatch.

## THE MAIN HATCH

The fuselage hatch is fairly large and is built using a floor, stringers, and planking. Build the hatch in place on the fuselage structure using 1/16-inch balsa for the floor, with the grain running crosswise. Using the H-formers, 1/8-inch-square balsa, and a laminated top

stringer, frame out the hatch cover and plank it using 1/8 x 3/8-inch-wide balsa strips. Some of the hatch formers might need to be adjusted in width in order to fit smoothly. To fill out the cockpit, I used a Williams Brothers 1/6-scale pilot bust and instruments from Aero Team. The canopy is made from a portion of a SIG WW II bubble canopy. The hatch cover is held down using four strong rare-earth magnets.



## Skoda-Kauba V4 X0217A

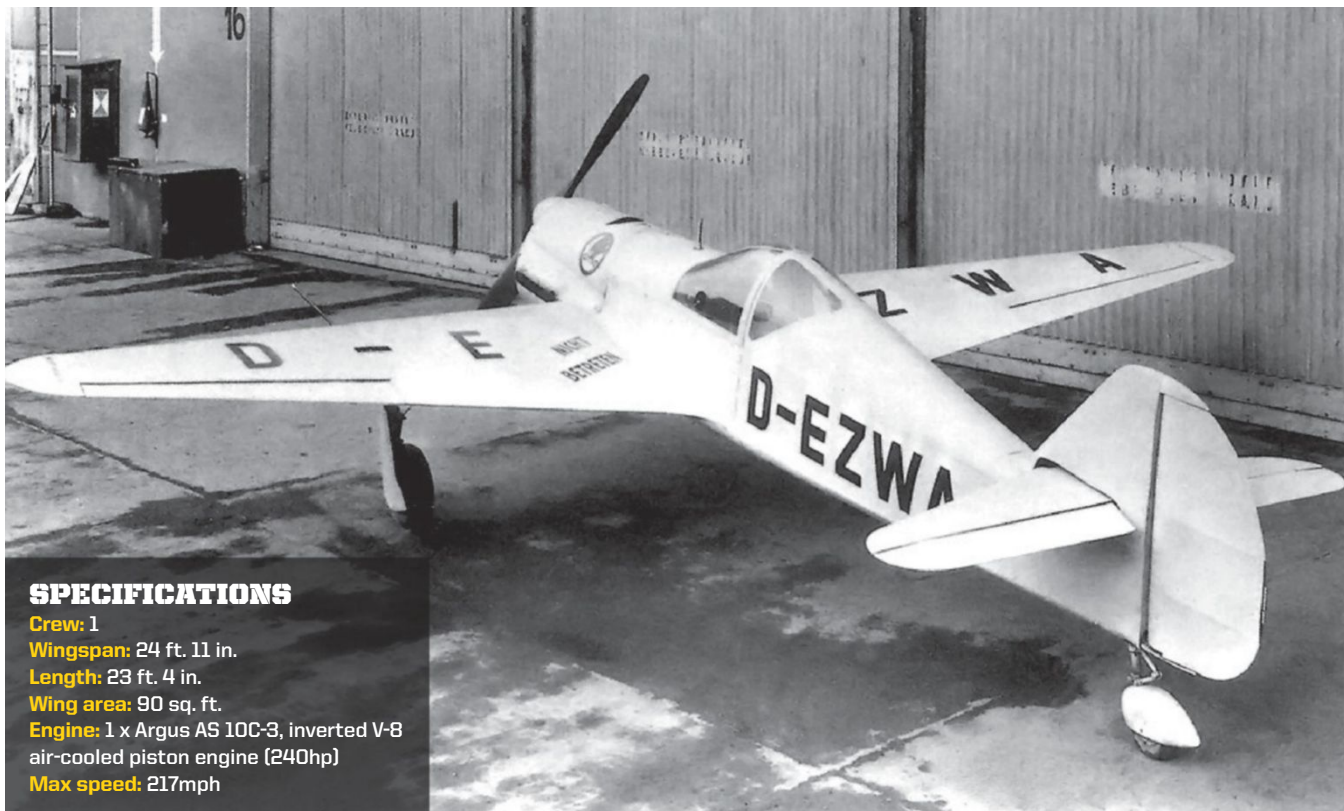
Designed by Mark Rittinger, the Skoda-Kauba V4 is an early WW II German fighter trainer aircraft with a highly tapered leading edge. It is not for beginners and requires an experienced pilot. It has foam-core wing construction and a built-up wood fuselage. The plans show the airfoil templates for cutting the wing cores.

WS: 49 in.; Power: E-flite Power 32; Radio: 4-ch.; LD: 2; 1 sheet; \$16.95



To order the full-size plan, visit [AirAgeStore.com](http://AirAgeStore.com).





## SPECIFICATIONS

**Crew:** 1

**Wingspan:** 24 ft. 11 in.

**Length:** 23 ft. 4 in.

**Wing area:** 90 sq. ft.

**Engine:** 1 x Argus AS 10C-3, inverted V-8 air-cooled piston engine (240hp)

**Max speed:** 217mph

## The Skoda-Kauba V4

Built by Avia as a fighter trainer in German-occupied Prague, Czechoslovakia, the S-K V4 was designed by Otto Kauba. Its highly tapered wing gave it the looks of a Rivets racer, and its inverted V8 240hp "Argus" powerplant made for a standout bird, both interesting and different. Built from nonstrategic materials, it used a tubular main wing spar that was tapered toward the wingtip. The ribs were welded into place, forming the basic wing framework, which was then covered with plywood. The fuselage featured welded steel-tube frame construction and was also covered with thin plywood. The V4 also featured an electric-powered horizontal stabilizer trim system.



Here, the nose block and the front of the airplane has been shaped and sanded smooth. The spinner is used as a guide to get the nose block shaped properly.



With the hatch cover (which includes the canopy section) removed, there is excellent access to the interior to allow you to get to the radio and power-system gear.

## TAIL FEATHERS

The stabilizer and the vertical fin are all made out of balsa. The horizontal stabilizer is 1/4-inch light-grain balsa with a wire elevator joiner. The vertical fin is made with 1/2-inch light balsa; using a razor plane, it is tapered to an airfoil shape. The rudder can be built up to save weight, or it can be made with solid light balsa. The horizontal stab should be set to zero degrees.

## FINAL ASSEMBLY

Install the E-flite Power 25 (or Power 32) motor with the shaft reversed, using an 2 1/4-inch E-flite spinner and a 60-amp speed control. Put in the servos, receiver, and other related radio gear. To cover the bird, I used Gloss Dove Gray MonoKote overall, and then added yellow bands (nonscale) to aid in visual orientation. The lettering is flat black MonoKote. Set the initial center of gravity (CG) at a forward point of 22% of the mean aerodynamic chord. Once you establish the proper battery placement, build a flat deck on the wing center and secure your battery pack to it. The model likes a forward CG, so start flight testing at the 22%





Because I did not install retractors, I added the detail of the landing gear in the retracted position, by drawing it on the wing.

balance point. You can always work it back to your liking later. The position might look "off" on the plan side view, but this is due to the highly swept leading edge.

#### IN THE AIR

Ready to fly, the prototype came out at 52 ounces with a 4S 2250mAh "Pulse" LiPo battery pack. Flying with the Power 32 motor, a 11x8 APC E-prop, power is at 37 amps and 550 watts. It has also flown with a 12x8 APC E-prop at 43 amps and 620 watts. I cruise around at one-half to two-thirds power and land at three minutes with about half a pack remaining.

Before you launch, double-check your CG, control throws, and directions (i.e., left is left, up is up, etc.). A dolly takeoff is fairly straightforward, but having a friend hand-launch for your first flight is best. It required a firm toss at a 30-degree nose-high attitude. Thrown firmly, wings level, it might drop the left wing a bit, so be prepared. After a few times, it becomes a nonevent.

The SK V4 will slow down surprisingly well. This is more than likely due to its airfoil thickness. Try slow-speed flight at altitude

before your first landing. If slowed too much, the left wing will drop abruptly! You can thank the wing sweep and tiny tips for that.

The model has a very "clean" airframe, and it retains speed well. It grooves nicely at speed and handles well on low rates. The SK V4 looks the part of a WW II trainer aircraft, and it flies like a fighter. It's rock solid at the top end, with plenty of control authority.

With a 4% camber airfoil, the bird likes to do aerobatics, including fast and slow rolls as well as point rolls and figure-8 maneuvers. Inverted flight is no problem. Just about anything a warbird would do, it can do also.

Coming in for a landing is simple. Leave enough battery power for a go-around if needed. Keep in mind that it likes to retain speed, so set up your final a bit longer than normal and bring in straight into the wind. The rudder is very effective to adjust for any crosswind.

#### BOTTOM LINE

I really loved building and flying this unique bird. I hope you enjoy your Skoda-Kauba V4 as well. If you have any questions, feel free to contact me at mrittinger70@hotmail.com. ✈

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# MASTERING KNIFE-EDGE VARIATIONS

**Wow the crowd with these  
impressive maneuvers**

BY JOHN GLEZELLIS PHOTOS BY JOHN REID ILLUSTRATIONS BY FX MODELS

For aerobatic pilots, being able to perform traditional knife-edge passes is beneficial for several reasons. First of all, it is a fun maneuver to master and perform, and it serves as a prerequisite for other aerobatic maneuvers, such as the 4- and 8-point rolls. Moreover, it also helps teach that both proper setup of the aircraft and the pilot's abilities are required to properly execute precision maneuvers. To truly master the knife-edge pass requires taking advantage of computer radio systems as they make the task of performing the maneuver properly and accurately much easier to learn.

Knife-edge flight is both exciting and challenging to do smoothly. Throttle and rudder inputs are needed to maintain a constant altitude.







## Getting Started

As a starting point, always begin with your aircraft's manufacturer recommendations for control-surface deflection, exponential settings, and center of gravity placement. Common setup mistakes in these areas will make it harder to dial in your aircraft. Using a ruler, start by checking the amount of maximum deflection for each surface; if your model uses two elevator servos (one for each half), be sure that each elevator has the same travel. Do the same thing for the ailerons, and apply the proper amount of differential.

### RATES AND EXPO

The radio's rate settings should provide you with enough control-surface deflection to perform your various maneuvers. By using dual (or even triple) rates, you can perform the knife-edge and then, with the flip of a switch, execute a spin or torque roll. If you try to fly your entire flight on a single rate, you'll often find that the airplane is too sensitive, making precise maneuvers too difficult to fly. Similarly, using the correct percentage of exponential will soften how your aircraft reacts around the neutral stick position. A great starting point is typically 20 percent expo on all control surfaces for "low-rate" setting. You can then after some test flights, make adjustments as required, to adjust response to your individual needs.

### MIXES

For the next step, you'll need to perform a knife-edge and observe the natural results. Once the airplane is rolled 90 degrees to knife-edge flight and you command rudder input to maintain altitude, you might notice that the aircraft may push (in pitch) toward the landing gear or pull toward the canopy. You then need to add the proper amount of mix percentage for elevator correction to keep your flight path straight and parallel to the runway. This greatly decreases your pilot workload and improves your flight results.

In this example, rudder-to-elevator mix is needed; the rudder channel is the "master" channel, and the elevator is the "slave" channel. Similarly, if your model exhibits any rolling tendencies while applying rudder during the knife-edge, a second mix—rudder-to-aileron—can be used. Most computer radios allow mixing percentages in 0.5 percent increments to allow precise tuning of the model. If the mix percentage impacts other aerobatic figures, you can assign the mix setting to the mix switch so that it is not active throughout the entire duration of the flight.

Additionally, multipoint mixes can be used for situations where nonlinear responses occur during different rudder-deflection settings throughout the knife-edge maneuver. For example, if you fly a knife-edge by holding enough rudder deflection to sustain a particular altitude but then wish to transition into a climbing half knife-edge loop, you might find that the aircraft pitches in one direction or another when additional rudder input is applied. To correct this, create one mix percentage function when a specific amount of rudder is commanded, but when the rudder passes that deflection point, program the mix percentage to change. The benefits of multipoint curve mixes versus standard mix settings can only be determined with flight testing.



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## Basic Knife-Edge Pass

To enter the knife-edge pass, align the airplane parallel to the runway about 150 feet in altitude. As the model approaches the runway, increase throttle and perform a 90-degree roll. At that point, you'll need to apply rudder, as needed, to maintain altitude. To exit the maneuver, simply perform another 90-degree roll to upright level flight. During the first attempt, you might be surprised at how much rudder input is required to maintain altitude while in the knife-edge attitude. During the first few attempts, you should perform the maneuver at a moderately high altitude. Also pull the nose up to about 10 degrees positive relative to the horizon. This allows additional time to roll the airplane and apply rudder.

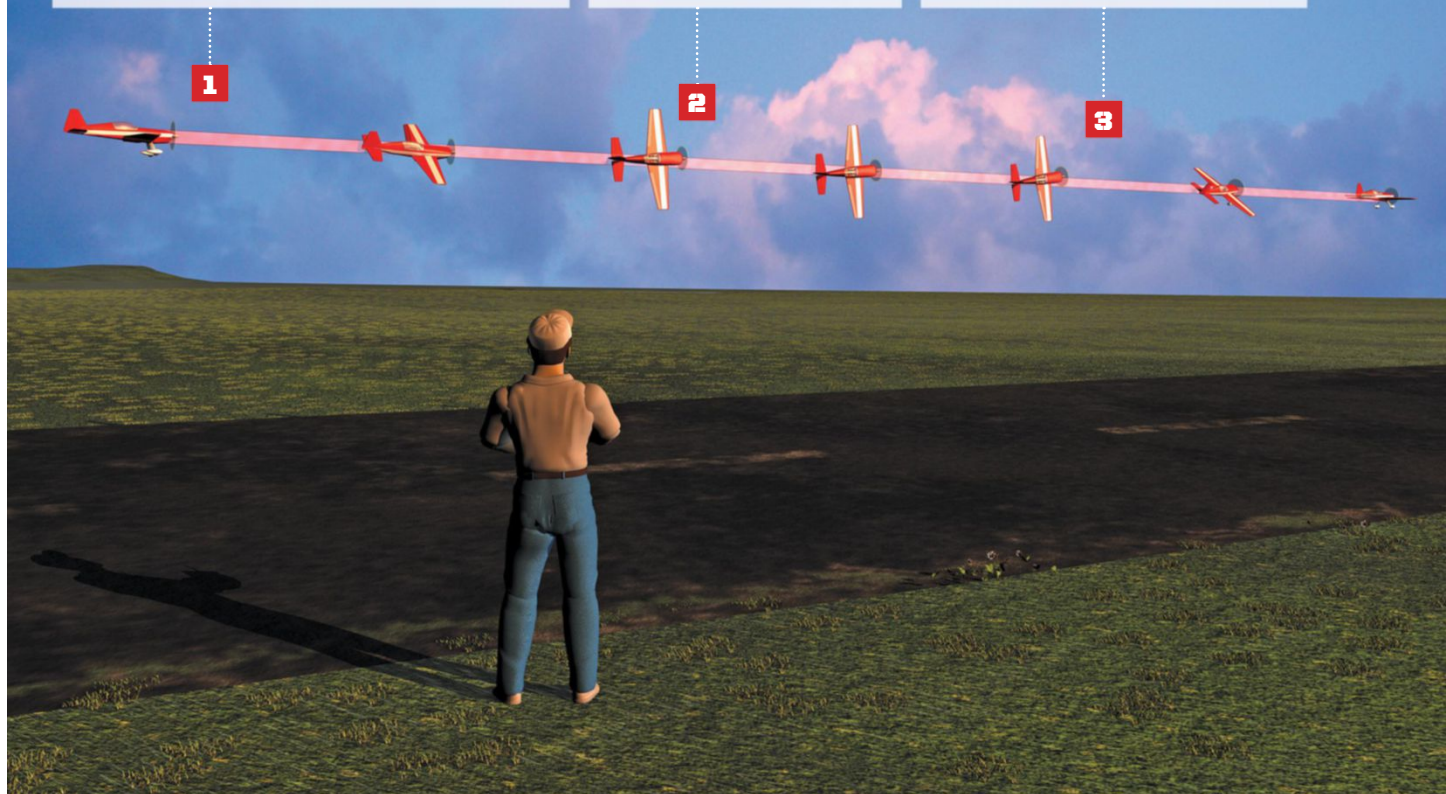


Proper knife-edge passes require constant corrective inputs to maintain a straight line. Using your computer radio's mixes also helps dial out unwanted responses to rudder input.

**Step 1:** Flying from left to right, begin by aligning the aircraft with the runway, flying into the wind. Increase throttle to 60 percent, and ensure that your proper flight mode is selected. At about 200 feet from the center point, perform a 90-degree roll to the right so that the canopy is facing you; apply left rudder (top rudder) to maintain altitude. During the roll, some rudder input might be required. You want to execute a smooth 90-degree roll with no heading or altitude loss.

**Step 2:** The entire maneuver should be centered on the pilot. The distance flown with wings in knife-edge should be equal on the left and right halves. Also keep in mind that you might need to apply slight corrective inputs to sustain altitude and the desired roll angle.

**Step 3:** To exit the maneuver, perform a 90-degree roll to the left, back to upright level flight. Prepare to repeat the maneuver again until you have it perfected. Remember, practice and a properly trimmed aircraft are required to master the knife-edge pass. Keep at it until you get it right and it becomes second nature.





## Knife-Edge Circle with a Snap

Seeing an airplane roll 90 degrees to knife-edge flight, then have its pilot push the elevator stick to initiate a knife-edge circle, all while maintaining precise altitude, is certainly a sight to behold. Over time, pilots began adding their own twists to this impressive maneuver, and numerous variations are possible. My favorite is the knife-edge circle with a 1 1/2 positive snap roll. This produces a maneuver that combines an inside knife-edge circle during the first half of the maneuver and an outside knife-edge flight on the second half. The final maneuver looks elegant while maintaining a certain degree of aggressiveness.

### GETTING STARTED

After mastering the straight knife-edge pass and becoming more familiar with the flight characteristics of your model, make any trim changes to your airplane to meet your needs. While some 3D models with extremely large control surfaces and very large deflections might require multiple rate settings, I prefer to use one rate setting (low rate) for both precise rolling maneuvers and snap rolls. I use about 30 degrees of aileron deflection, 25 degrees of elevator deflection, and 30 degrees of rudder deflection with about 20% of exponential added to all controls.

### OVERVIEW

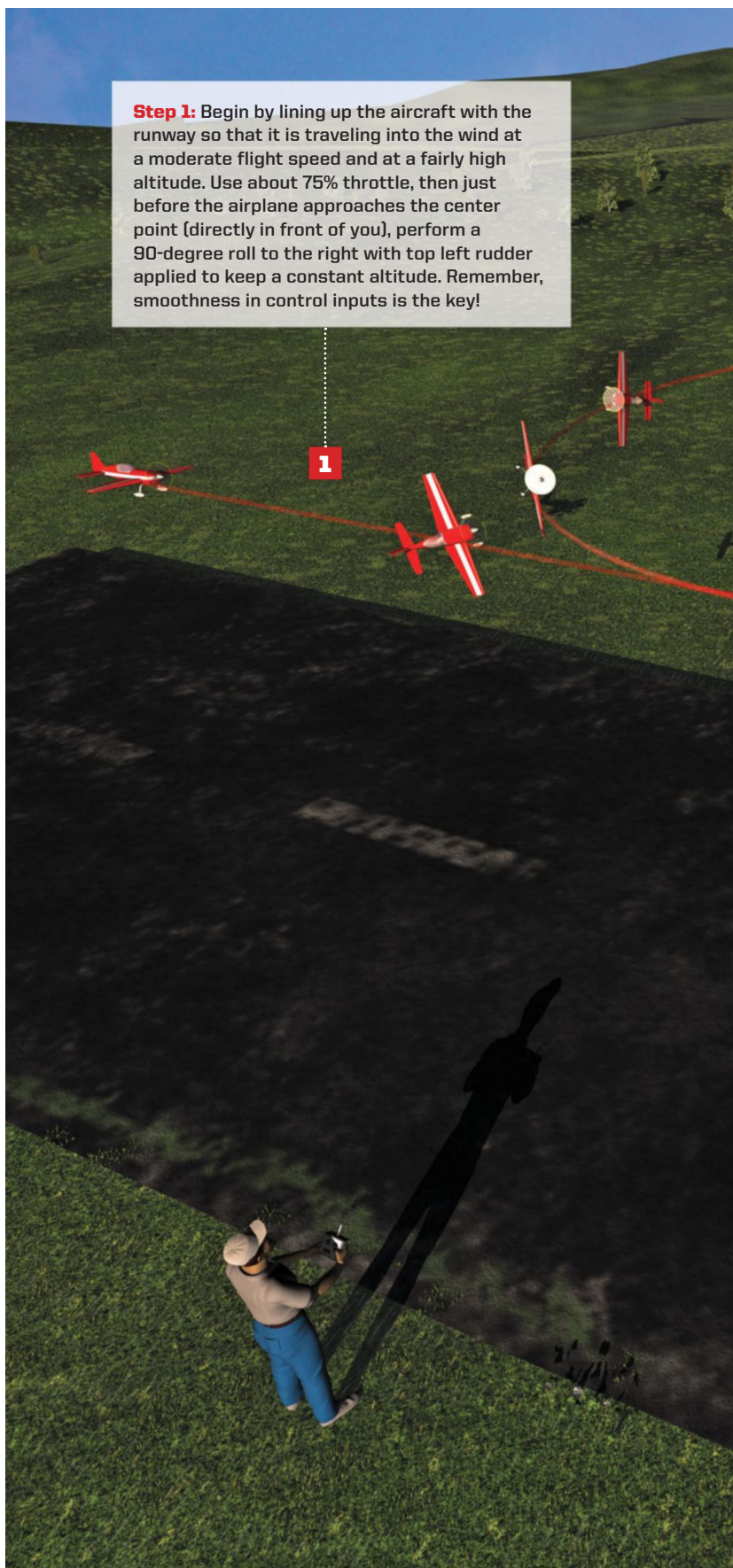
To begin, fly the airplane in upright level flight, parallel to the runway, traveling into the wind at a moderate speed. The maneuver shown is being flown from left to right and at about 50 feet altitude. Just before the airplane reaches you, roll the aircraft 90 degrees to the right into knife-edge flight and apply top left rudder to maintain altitude. The top of the airplane should be pointing toward you. As soon as the airplane passes directly in front of you, begin lightly pushing (down) elevator to initiate the circle. The radius of the first 90-degree quadrant of the circle dictates the overall diameter of the circle.

As soon as the airplane is about 45 percent complete with the circle, execute a positive 1 1/2 snap roll so that the snap rotation is centered at the far midway point of the circle. The direction of the snap roll should be the same direction as the top rudder. With top left rudder, the snap roll should be to the left. Once the snap roll is completed, immediately switch to top right rudder and begin pulling (up) elevator to complete the second half of this knife-edge circle. Apply corrective elevator and rudder inputs as needed to keep the diameter of the second half of the circle the same size as the first, while also maintaining the same altitude. Once the maneuver is complete and the airplane is about 50 feet past you, perform a 90-degree roll to the right and exit the maneuver in straight upright level flight.

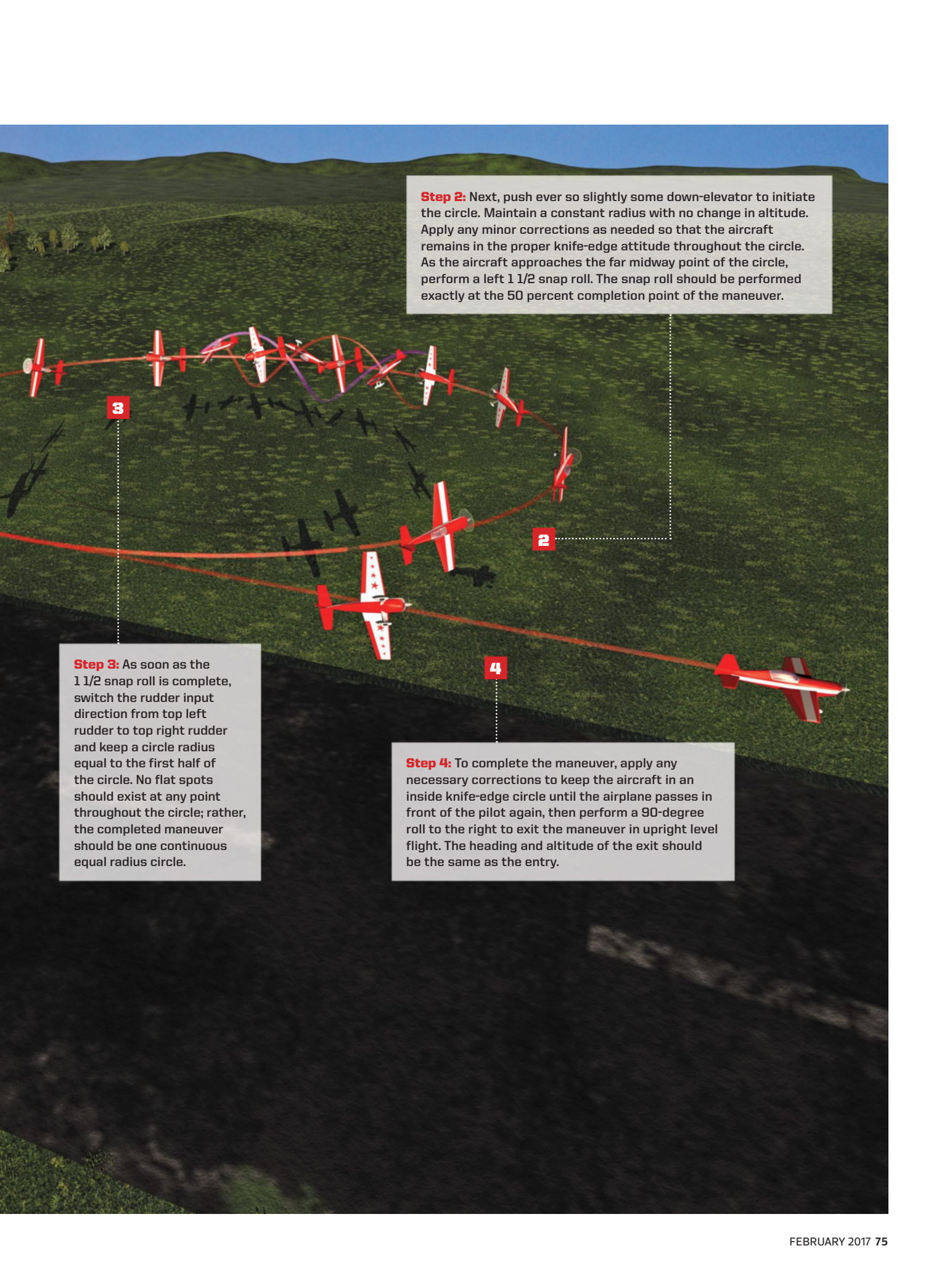
### FINAL THOUGHTS

These are challenging maneuvers and will require practice and proper aircraft setup techniques to successfully master them. Fly the maneuver again and again until you can execute them at will without any difficulty. Try different control-surface deflection amounts and exponential settings to fine-tune your plane to your liking. After you're familiar with your model and how it performs, start decreasing the altitude and perform the maneuvers lower to the ground. Then, when the time comes for added thrills and excitement, try your own variations by adding multiple snaps or by combining the maneuvers with others to develop your own unique sequences. Above all else, keep the aircraft safe, communicate with others at the flying field, and have fun! ✈

**Step 1:** Begin by lining up the aircraft with the runway so that it is traveling into the wind at a moderate flight speed and at a fairly high altitude. Use about 75% throttle, then just before the airplane approaches the center point (directly in front of you), perform a 90-degree roll to the right with top left rudder applied to keep a constant altitude. Remember, smoothness in control inputs is the key!







**Step 2:** Next, push ever so slightly some down-elevator to initiate the circle. Maintain a constant radius with no change in altitude. Apply any minor corrections as needed so that the aircraft remains in the proper knife-edge attitude throughout the circle. As the aircraft approaches the far midway point of the circle, perform a left 1 1/2 snap roll. The snap roll should be performed exactly at the 50 percent completion point of the maneuver.

**Step 3:** As soon as the 1 1/2 snap roll is complete, switch the rudder input direction from top left rudder to top right rudder and keep a circle radius equal to the first half of the circle. No flat spots should exist at any point throughout the circle; rather, the completed maneuver should be one continuous equal radius circle.

**Step 4:** To complete the maneuver, apply any necessary corrections to keep the aircraft in an inside knife-edge circle until the airplane passes in front of the pilot again, then perform a 90-degree roll to the right to exit the maneuver in upright level flight. The heading and altitude of the exit should be the same as the entry.



# GAUI R5

## Awesome speed in a streamlined package

BY JIM RYAN PHOTOS BY JOHN KAUK & JIM RYAN

**I've been fascinated by speed helicopters** ever since I first saw them at the IRCHA Jamboree years ago. These high-powered dragsters have amazing performance, and it's always thrilling to see them fly. Many speed helis are custom-built or limited-run designs, but with the release of the R5, Gaui has produced an impressive speed heli within the means of most pilots. From the moment I first saw this beautiful helicopter, I couldn't wait to fly one.



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Speed helicopters are exciting machines, and the Gaui R5, available in the United States through Empire Hobby, can get you flying in a weekend. This beautifully engineered helicopter looks great from every angle and has produced official speed runs of more than 140mph!





This is one great-looking machine. I was lucky enough to do my early flights in the wide-open space of eWeek at Triple Tree Aerodrome. This speedster really covers ground, so a large airfield is a must.

## SPECIFICATIONS

**MODEL:** Gaui R5  
**MANUFACTURER:** Gaui ([gaui.com.tw](http://gaui.com.tw))  
**DISTRIBUTOR:** Empire Hobby ([empirerc.com](http://empirerc.com))  
**TYPE:** 580-class speed helicopter  
**LENGTH:** 47.05 in.  
**ROTOR DIAMETER:** 51.22 in.  
**WEIGHT:** 10 lb. (4.54kg)  
**POWER REQ'D:** 12S 3000mAh LiPo battery  
**PRICE:** \$1,079

## GEAR USED

**RADIO:** Spektrum DX9 transmitter and AR7210BX receiver ([spektrumrc.com](http://spektrumrc.com)); Pulse 2S 1350mAh LiPo battery  
**SERVOs:** Hitec HS-8360TH (cyclic) and HSG-8315BH (tail) ([hitecrd.com](http://hitecrd.com))  
**MOTOR:** Scorpion HK-4530 540Kv and Castle Creations Edge 120 HV speed control  
**BATTERY:** Pulse 12S 3000mAh LiPo

## HIGHLIGHTS

- 👁️ Eye-popping performance
- 🔧 High-quality streamlined body
- 🏆 Excellent engineering and parts fit
- 📖 Clear and concise manual



## UNIQUE FEATURES

Like the rest of Gaii's product line, the R5 is available in the United States through Empire Hobby, making spares readily available. The most notable feature of the R5 is the fully enclosed pumpkinseed fuselage. Speed designs seek to pack maximum horsepower into the narrowest possible body. The reason for the narrow, deep-section body is that on a sprint the helicopter is in an extreme nose-down attitude, making the top aspect just as important as minimal frontal area. Even the enclosed tail boom has a teardrop profile, with a sharp keel to minimize turbulence and drag. The R5 even eliminates the drag of traditional landing skids by using a small landing skreg that pivots 90 degrees to blend into the belly. It's simple and ingenious.

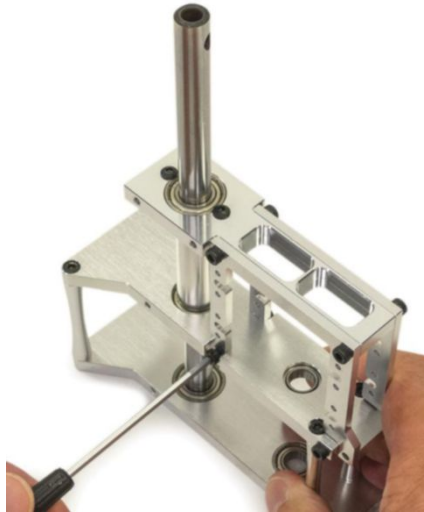
The R5 further increases performance by packing a 700-class powertrain into a 580-class package. The motor, controller, battery, and servos are all 700-class hardware, and the drivetrain is designed to handle all that power. When the kit and hardware arrived at my shop, I could hardly wait to get started.

The R5 is a true kit build, with only items like the rotor head and swashplate partially preassembled. Still, only basic hand tools are needed for assembly. The thoroughness of the packaging and manual are very impressive; parts for each assembly step are sealed into clearly numbered pouches, which are called out in the manual. The 3D renderings in the manual are excellent, making it easy to see how everything fits together. As with any helicopter build, be sure to use non-permanent thread-lock, such as Loctite 242, for all metal-to-metal screw assemblies.

Belt tension for the tail drive is set by a spring-loaded idler, making this adjustment simple even inside the enclosed body. The pivoting landing skreg and retract servo are installed in a lightweight baseplate, thereby transferring landing loads to the main mechanics.

In spite of the narrow streamlined fuselage, the R5 has ample room for a range of 700-class motors. I chose the recommended 540Kv Scorpion HK-4530 from Empire and a Castle Creations Edge 120 HV speed control. I programmed the Edge 120 for head speeds of 2000, 2300, and 2800rpm. Given the power demands of the high-output Hitec servos, I opted for a Pulse 2S 1350mAh LiPo pack as a dedicated radio battery.

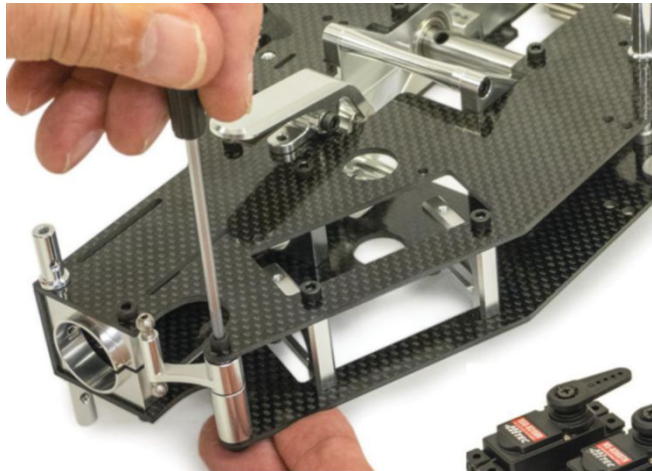
The R5 can accommodate any number of flybarless units. I chose a Spektrum/BeastX AR7210BX because I own several of them and can nearly set them up in my sleep. The R5 can hold 12S battery packs up to 3500mAh; I selected a Pulse 12S 3000mAh LiPo pack rated for 45C, and it fit with room to spare. On the updated version, the canopy is secured with two screws at the rear edge, keeping it place even under the heavy air loads of maximum speed runs. With the R5 completed and programmed, it was time to charge the batteries and head to the field.



**The layout of the super-narrow mechanics is very different from typical RC helis. The R5 has a two-stage hybrid belt/gear drivetrain, and the cyclic servos are stacked to save space.**

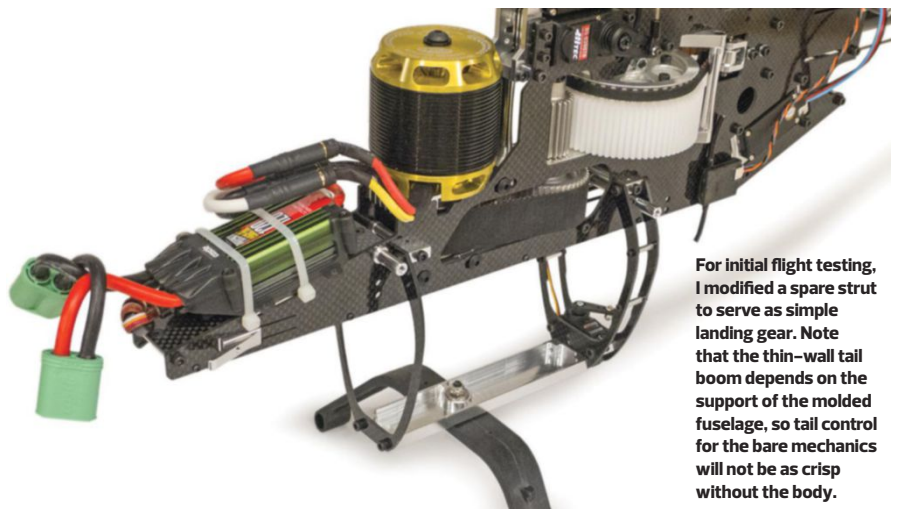


**The massive main gear is more than an inch high. Note how the hub has a recess to make installing the bearing shim a simple matter. This is typical of the careful planning throughout the kit.**



**This linkage arm allows the tail servo to be mounted on center and still line up with the tail control rod. You can also see the spring-loaded idler pulley for adjusting belt tension. This makes tensioning the belt a simple matter, even inside the enclosed body. The lever provides a visual cue that tension is correctly set.**

**Speed helis impose heavy loads on cyclic servos, so I chose Hitec's high-voltage coreless servo pack. The HS-8360TH cyclic servos have titanium gears and pack more than 220 oz.-in. of torque, while the HSG-8315BH tail servo has 0.04-second transit speed, 760  $\mu$ s pulse length, and 560Hz frequency.**



**For initial flight testing, I modified a spare strut to serve as simple landing gear. Note that the thin-wall tail boom depends on the support of the molded fuselage, so tail control for the bare mechanics will not be as crisp without the body.**

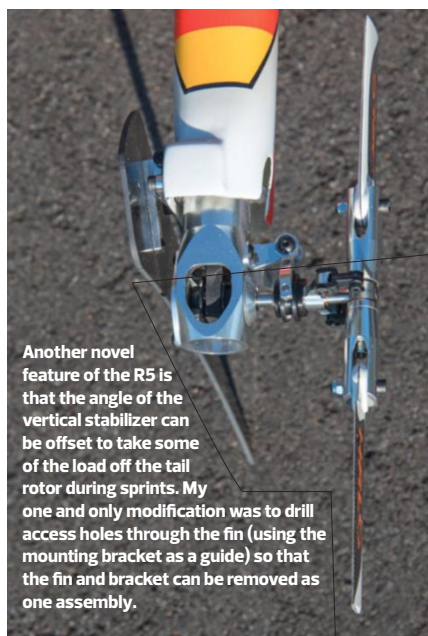




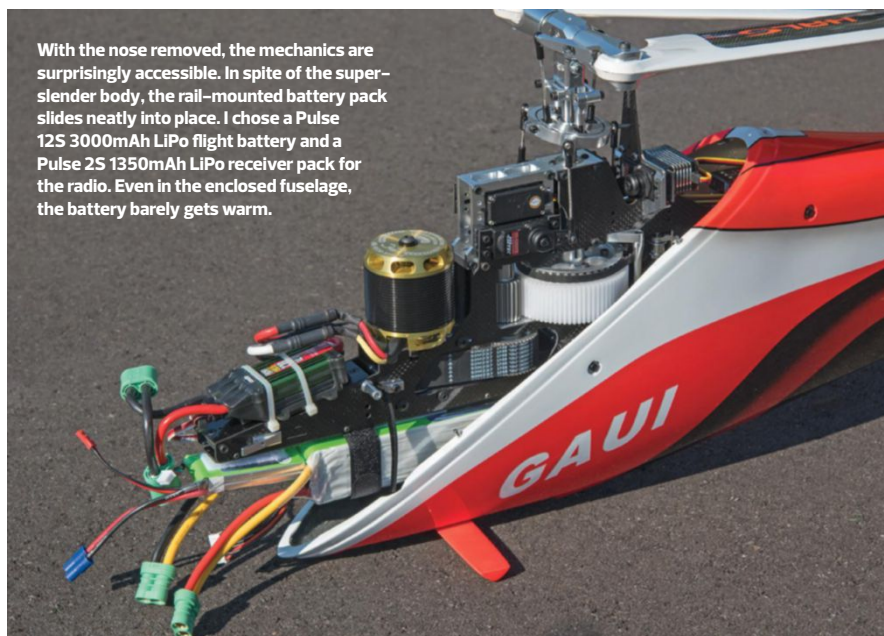
The R5 breathes sexy from every angle. On a speed run, the nose is pitched steeply downward, but there's no tendency to porpoise. From head on, the profile is razor thin, but maintaining orientation has proved remarkably easy.

## Built for Speed

To obtain the narrowest possible assembly, the layout of the mechanics is different from most RC helis. The main drivetrain is a two-stage hybrid belt/gear drive design, and the cyclic servos are stacked in an unusual configuration to save space. The fit of the 3D-designed components is perfect. Attention to detail in the design is outstanding. As with many large helicopters, the R5 has a mounting tray for the 12S LiPo pack, but this sliding-rail design is particularly well executed. One would expect the battery to be a difficult fit in a helicopter this narrow, but in fact, the battery slides in with ease and locks securely in place.



Another novel feature of the R5 is that the angle of the vertical stabilizer can be offset to take some of the load off the tail rotor during sprints. My one and only modification was to drill access holes through the fin (using the mounting bracket as a guide) so that the fin and bracket can be removed as one assembly.



With the nose removed, the mechanics are surprisingly accessible. In spite of the super-slender body, the rail-mounted battery pack slides neatly into place. I chose a Pulse 12S 3000mAh LiPo flight battery and a Pulse 2S 1350mAh LiPo receiver pack for the radio. Even in the enclosed fuselage, the battery barely gets warm.

## IN THE AIR

I don't know when I've been this antsy over a test flight. Like driving a high-performance sports car, you might know in your heart that the handling is going to be excellent, but you still don't want to ding the paint. I needn't have worried. The handling could hardly have been any better. At normal headspeed (governed to 2000rpm), the R5 is actually quite docile.

## GENERAL FLIGHT PERFORMANCE

**Stability and tracking:** Stability and tracking are crucial for a speed helicopter; you don't want to be fighting pitch issues when you're ripping through the trap at 140mph. With the

reliable BeastX FBL and Hitec servo suite, the R5 flies as if it's on rails. There's no tendency to porpoise or yaw, and this is crucial for getting maximum speed. I was surprised how quickly I got comfortable with this helicopter.

**Aerobatics:** While the R5 is designed for speed, Gaui factory pilots, such as Mitch Marozas, love to show off its aerobatic chops. With the weight of the fully enclosed body, the R5 isn't going to match pure 3D machines, like Gaui's X5, but it handles basic aerobatics nicely and looks great doing it.

**Landing:** With the tall ground profile and the relatively narrow 6-inch landing skid, the R5 does require some care for landing. I looked for a

firm level spot to set down and landed with the nose pointing into the wind. It's important to stay on the cyclic as the rotor spools down. As long as you're careful, landings can be handled safely.

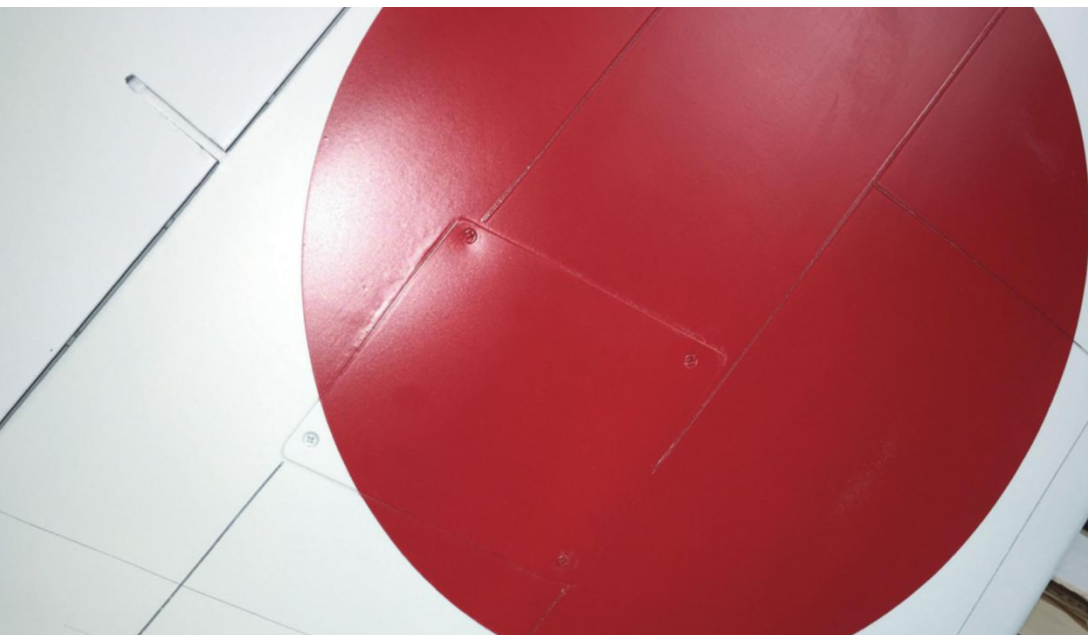
## PILOT DEBRIEFING

The Gaui R5 looks fantastic in the air and has absolutely dazzling performance. It is the most exhilarating helicopter I have flown.

## BOTTOM LINE

The Gaui R5 is the coolest and most exciting helicopter I have ever built. The design and quality are outstanding. It looks gorgeous in the air, and the performance is fantastic. ✚





Hatch covers allow easy access to wing servos, and they need to be neat and serviceable. Here, you see the aileron-servo hatch cover of a finished 1/4-scale Japanese Ki-43 "Oscar." It looks scale, and the wing markings make the hatch all but impossible to see from a distance.

## HOW TO

# Create Wing Hatches

QUICK AND EASY SERVO ACCESS

BY DENNY DEWEESE PHOTOS BY FRANK TIANO

If you like clean, strong hatch covers and you're a beginning builder, I have a great technique for you. These hatches can be used for access to ailerons, flaps, or any other wing servo that needs to be covered up. The important thing for any scale airplane is that it look scale and to keep the RC components hidden. Wing hatches can be ugly, or they can look like they belong on the plane, so why not do it the latter way in the first place? They need to be strong and neat, and look clean on the plane/wing surface, and they have to be made so that they stay put and won't vibrate off. For this article, we'll be making a hatch cover for the aileron servo of our current Grumman Hellcat project.

### YOU'LL NEED

First of all, the items you will need are few: a piece of 0.015 gauge (1/64 in.) FTE G-10 (a compressed fiberglass circuit board-like material), yellow Gold-N-Rod pushrod sleeve (S508) from Sullivan Products, and 2/56 x 1/4-inch button-head screws (four per hatch). You'll also need a single-edge razor blade, a set of drill bits, and 100-grit sandpaper.





## CREATING WING HATCHES

Cut an opening in the bottom of the wing for the servo installation. Make it large enough so that the servo can be easily installed and removed. You must have good, solid wood all the way around the opening, so you might want to add light-ply doublers glued under the wing sheeting where the screws will be installed. Cut the G-10 material to cover the opening with an overlap of at least 1/4 to 5/16 inch all the way around; to do this, use a sharp pair of scissors. Usually this hatch opening is about 3 inches by 4 inches on average with the corners slightly rounded for a good appearance. Sand the edges smooth, and position the cover over the opening and tape it in place. You can see through the material as it is semi-transparent. Make sure to center it so that you can see that

the overlap is even all the way around the opening. In each corner, make a pencil mark for the position of the attachment screws that will hold the cover in place. With the hatch still taped to the wing, drill the four screw holes with a drill bit slightly larger than the 2/56 screws. The holes in the wing will now line up perfectly with the hatch cover.

Sand the outside of the yellow Gold-N-Rod sleeve with the 100-grit sandpaper to rough it up and then cut four pieces about 1/2 inch long. Enlarge the holes around the servo opening so that the yellow sleeves fit snugly into place, with a little sticking out. To glue them in place, apply some thin Zap glue only around the outside, and let cure. Take the single-edge razor, lay it flat to the wing, and rock it back and forth to cut off the yellow sleeves flush to the wing. The nice



**1** The G-10 material is great for making wing hatch covers. Here the 3 x 4-inch opening has been cut for the wing servo, and the 0.015 G-10 hatch cover already has holes drilled into the corners.



**2** Here, the screw holes in the wing have been enlarged slightly so that the Gold-N-Rod sleeve material can fit snugly. After the sleeves have been glued in place, use a sharp, single-edge razor to trim them flush with the surface of the wing.



**3** Using 2-56 Phillips/button-head screws, secure the hatch cover in place. The Gold-N-Rod sleeves will accept the screws easily as they thread into place.





**4** The hatch lies flat against the wing, making a neat appearance. The yellow sleeves in the screw holes prevent the screws from vibrating out during flight.



**5** Here, you see the flap-servo hatch cover on a scale Douglas Skyraider. This type of hatch cover is ideal for all types of giant-scale airplanes. Once the model is painted, the hatch covers are less noticeable and resemble real aircraft panels.

thing about S508 Gold-N-Rod material is that it accepts the 2/56 bolt without any trouble and holds it tight. It prevents the bolt from ever vibrating out. Make sure that you can see

through the holes in the G-10 and into the holes in the sleeves with clearance all the way around. If they are not properly aligned, the hatch cover will not lie flat against the wing. ±

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# Dromida XL 370

## Wi-Fi-equipped, ready-to-fly FPV camera drone

BY THE MODEL AIRPLANE NEWS CREW PHOTOS BY PETER HALL

If you've been itching to get into a midsize camera drone that's easy to fly and takes no time to get into the air, the new Dromida XL 370 FPV Camera Drone is a great choice. Well established in the drone field, Dromida has several excellent quadcopters in its line, and the XL 370 is impressive, both in size and in capabilities. Let's take a closer look.

### SPECIFICATIONS

**MODEL:** XL 370

**MANUFACTURER:** Dromida ([dromida.com](http://dromida.com))

**DISTRIBUTOR:** Hobbico ([hobbico.com](http://hobbico.com))

**SIZE:** 370mm

**DIAGONAL MEASUREMENT:** 14.6 in.

**WEIGHT:** 15.9 oz.

**FLIGHT TIME:** 6 to 10 min.

**PRICE:** \$249.99

### GEAR USED

**RADIO:** MR101 2.4GHz transmitter (included)

**BATTERY:** Dromida 7.4V 20C 2200mAh LiPo (included)


**CAMERA:** Tactic 1080p DroneView Wi-Fi FPV camera w/ 4GB micro memory card (included)

### HIGHLIGHTS

- Rugged construction
- Stable flight performance
- FPV camera included







The Dromida XL has plenty of power and stability to fly outside in all kinds of weather, including some wind gusts.



A CAPABLE CAMERA DRONE THAT  
WILL HELP YOU DEVELOP YOUR  
AERIAL PHOTOGRAPHY SKILLS





## UNIQUE FEATURES

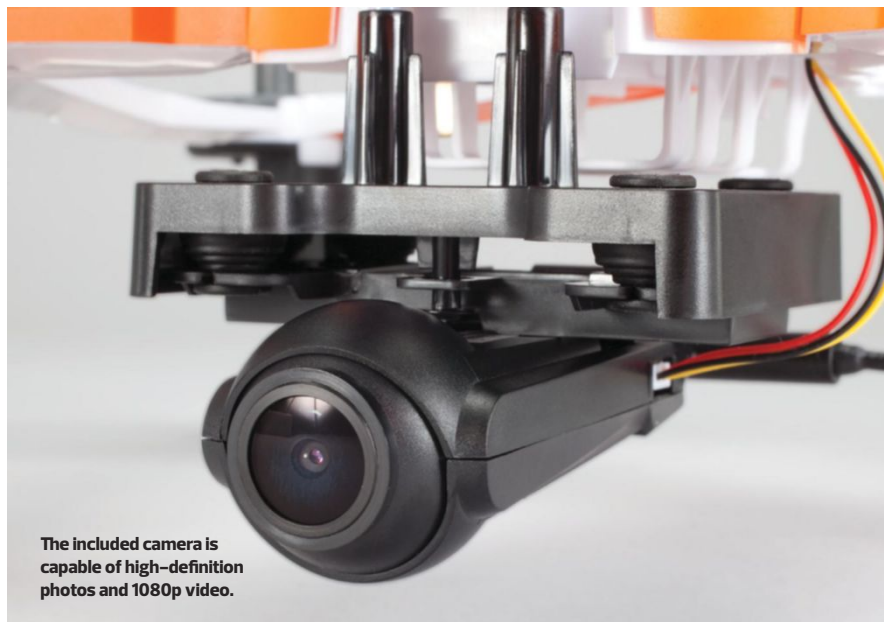
A true ready-to-fly drone, the XL 370 comes with its Tactic DroneView Wi-Fi HD FPV 1080p camera already attached to its rugged, sleek airframe. Available in red, orange, green, and blue body colors, the XL 370 is feature rich and comes with four optional propeller guards. Its MR1012.4GHz transmitter features Auto Takeoff and Landing buttons as well as a mobile device holder for your Wi-Fi-enabled iOS or Android cell phone. The downloadable DroneView app (free from the Google Play Store or the App Store) is easy to use and quickly connects to the camera. The transmitter also features dual rates and digital trims, an auto-flip button, and a motor start/stop button for added safety. Also included are a set of spare blades, a 2S 2200mAh LiPo flight battery, a charger and AC adapter, four propeller guards, a micro memory card, four AA batteries for the transmitter, a screwdriver, and an instruction manual. An LED lighting system also helps with visual orientation during the day and adds the fun of night flights to your flight log.

The Tactic 1080p DroneView camera can shoot high-definition as well as 720p video or still photos; it stores them onto the included 4GB micro memory card, or they can be downloaded to your smartphone. The transmitter has camera on/off control buttons for both video and still photos, and the Tactic FPV camera is attached to the drone with a sturdy vibration-damping mount to improve video and photo quality.

## IN THE AIR

To get the XL 370 into the air, you first bind the drone to the transmitter. Switch the radio on, then power up the drone and place it on a flat surface. The battery lead plugs into a fixed connector on the underside of the drone. The drone is ready to fly when the LEDs start flashing. The lights will then begin to flash slowly until you arm the transmitter by pushing the

throttle stick to full power and then pulling it back to the idle position. The next step is to press the motor on/off button to start the motors, then you can take off in one of two ways: You can simply advance the throttle until the drone lifts off, or you can press the Auto Takeoff button. Doing this, the drone cleanly lifts off and enters a stable hover about 4 to 5 feet above the ground. Either way, controlling the XL 370 is very easy.



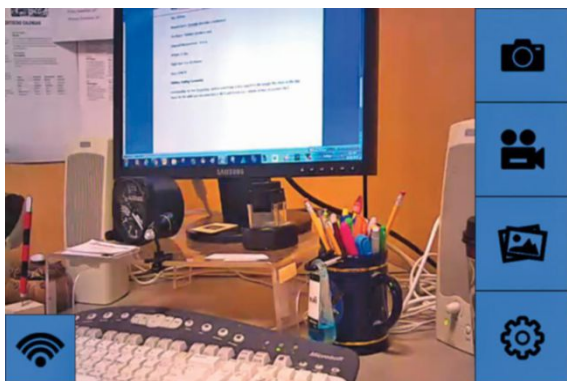




This is the Settings page, with the DroneView Wi-Fi network selected.

## Getting Connected

Downloading the free DroneView camera control app is easy from the Google Play Store or the App Store. Do this while you are connected to Wi-Fi and it takes only a minute or two. To connect the app to the camera, first go to your device's Settings page and select the Wi-Fi submenu. Look down until you see the DroneView Wi-Fi network and select it. Exit the Settings page, and launch the DroneView app. It will take a few seconds to connect, then you will see the screen showing what the



This is the connected view for the camera, and the submenu column is shown.



The Dromida XL's transmitter has a mobile phone-holding fixture attached to the top of the case.

camera is pointing at. There is a submenu column on the right side of the screen, and you use it to make on-screen adjustments as well as to take photos or turn the video camera on and off. Also, if you do not have the memory card in the camera slot, it will give you a warning. You need the memory card in place to take photos and video. There is also a File Gallery, where you can see all your digital images and video files, sort them, delete them, or export them to your mobile device.

## HIGH AND LOW RATES

The default control sensitivity is in the low-rate selection, and the XL 370's control response makes it easy to maintain a steady hover. Once you get use to its flight characteristics, you can

switch to high rates for added performance and speed. You can switch from low rates to high rates and back again by pressing the right stick downward until you hear a beep. A built-in three-axis gyro with three accelerometers help

the XL 370 maintain smooth, stable flight, while a built-in Altitude Hold barometer aids in station keeping after the model takes off. Overall, the XL 370 is a great-flying drone, which is easy enough to fly that even a low-time beginner will have little trouble during the learning curve.



The flight battery fits into a bracket molded into the chassis, and it plugs into a fixed connector to power up the drone.

## FLIP ON DEMAND

The Dromida XL also is equipped with an auto-flip function. To do this, you should first climb up to an altitude of about 25 to 30 feet and enter a hover. Next, press the left (throttle) stick downward until you hear a beep, then use the right stick and move in the direction that you want the drone to flip. Return the stick to neutral and the drone will flip in that direction.

## BOTTOM LINE

The Dromida XL 370 FPV camera drone is a great quadcopter to fly and have fun with. It is stable enough for the very new beginner pilot while having plenty of performance on tap to satisfy the experienced pilot. Coupled with the downloadable DroneView app, the Dromida XL is a capable camera drone that will help you develop your aerial photography skills. Give it a try; you'll love it. ✈



## 48 Years of RC Engine Advice

**[Q&A]** Email your questions to Clarence Lee at [MAN@airage.com](mailto:MAN@airage.com).

**O**ur column this month is another milestone in the writing of the column as we will now be starting our 48th year, with the first column having appeared in the January 1969 issue of *R/C Modeler* magazine. (Normally, this column would have appeared in the January issue, but other events got us bumped back a month.) After 36 Years with *RCM*, the magazine decided to close its doors in 2005, which caught me by surprise with five unpublished columns. This came about because I was led to believe that the magazine was in the process of being sold and taken over by a new owner, so I continued to turn in columns. The deal fell through, however, and *RCM* ceased publication. Although I received offers from other publications, I had about decided to stop writing when Debra Cleghorn, the editor of *Model Airplane News*, heard about the situation through a mutual friend and gave me a phone call, offering to purchase the unpublished columns and convincing me to continue writing for *MAN*. After thinking things over, particularly about getting paid for the unpublished columns, I decided to accept her offer, and the first column appeared in the April 2006 issue of *MAN*.

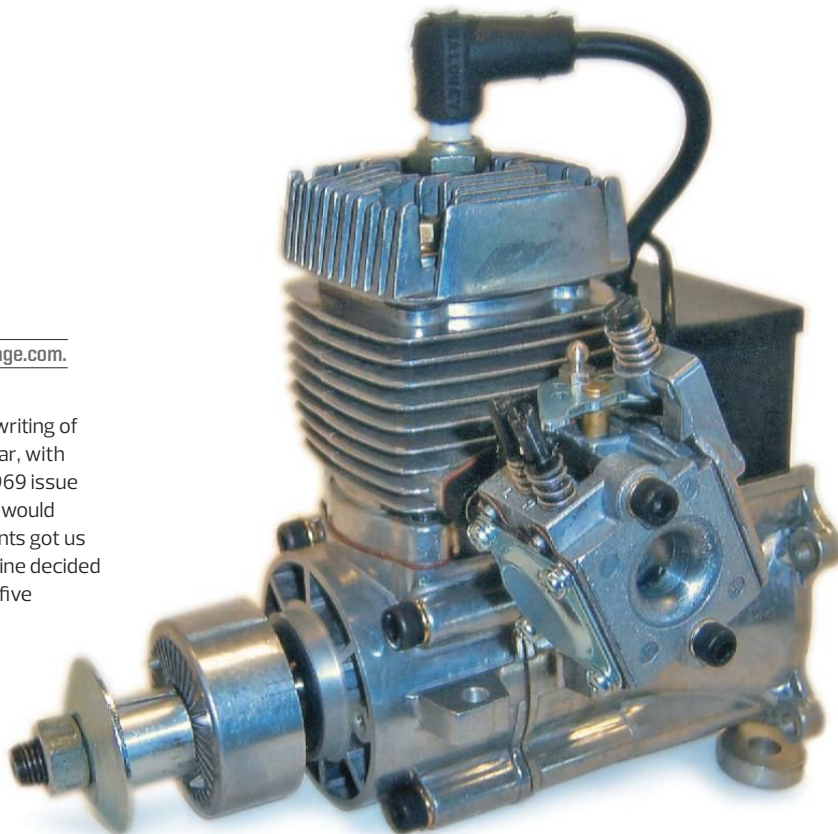
So here we are, coming up on 12 years of writing the column for *MAN*, and we hope to be able to continue for a few more years. As I have pointed out many times over the years, however, it is the readers' letters that keep the column going. In years past, we usually received a half dozen or more letters every week. Now, we are lucky to get five or six a month, with quite a few of these not having a particular problem but looking for parts for an out-of-production engine or wanting to know if I can identify an engine the reader has acquired. So don't leave it up to the next person to write. The drop in letters is more than likely due, in part, to the electrics having a serious impact on the fuel-powered engines, with many of the larger model-engine manufacturers, such as Fox, Webra, HB, and HP, having gone out of business and the few that remain struggling to stay afloat.

Our first letter is typical of those we have been receiving lately.

### MAGNETO MALONEY

✉ I have been reading your column for more than 20 years now and am pretty familiar with most of the more popular engines. However, I recently purchased an engine at a local yard sale that I had never heard of. It is a fairly large engine and appears to be about a 120. It has Maloney in small print on each side of the cylinder and uses a magneto for ignition. The engine looks to be close to new and has excellent compression. The price was also right at only \$60. I know this is limited information, but can you identify the engine and tell me who made it and when? Any information would be appreciated. I intend to use the engine on a 1/6-scale WW I SE.5.—Jim Kelly, Glendale, AZ

**Answer:** Jim, your Maloney engine was made in Korea for the late John Maloney who operated World Engines, which imported the Super Tigre and O.S. engines back in the 1980s and '90s. In 1987, John introduced the Maloney 100 with a displacement of 1.0ci. The Maloney 100 was the first modern-day gasoline engine designed expressly for model aircraft,



**The Maloney 125 was the first two-stroke gasoline engine designed expressly for RC aircraft. It was not a modified leaf blower or industrial-type engine.**

although it did show some signs of having been built or influenced by a chain-saw or leaf-blower manufacturer. However, although well built, the engine was a little shy in the power department in relation to its weight, so steps were taken to increase the engine's power. This was done by increasing both the bore and stroke as well as increasing the compression ratio along with other internal modifications. The engine now became the Maloney 125 (1.25ci.) engine, developing the same power as most of the 120-size four-stroke glow engines of that era. We did an in-depth review of the engine back in the February 1988 issue of *R/C Modeler*. The 100 and 125 are identical in appearance, sharing the same crankcase. You can distinguish the engines by looking in the exhaust port. The 100 had a single ring piston and the 125 two rings. The engine did have one undesirable feature that more than likely affected its sales. The engine could not be hand-started and required an electric starter. This was due to the magneto firing the spark plug at 34 degrees before top center, which is actually perfect timing for maximum power. However, this also led to vicious kickback tendencies, so the Maloney magneto did not start to fire until the engine was turning approximately 1,700rpm.

I recommend removing the magneto and related parts, which will cut 11.4 ounces from the engine's weight, and installing a CH Ignitions ([ch-ignitions.com](http://ch-ignitions.com)) electronic-ignition system that automatically changes the engine timing for starting. Hopefully, you bought the 125 engine, but even so, either engine should power your SE.5 just fine.

### PROPER BALANCE

✉ I have only been in the hobby of RC flying for a short time and noticed in one of your columns that you mentioned the importance of balancing the propeller. How do I go about doing this, and is there a commercial tool or prop balancer available for this purpose?—Dave Robertson, Phoenix, AZ

**Answer:** Dave, the importance of balancing a prop cannot be stressed



enough. An out-of-balance prop can cause excessive vibration, leading, in turn, to screws loosening, engine mounts breaking, firewalls coming loose, control surfaces failing, the servos and radio gear being damaged, not to mention causing the fuel in the fuel tank to foam, causing erratic engine operation. Balancing a prop is a simple operation. Although not as accurate as some of the prop balancers intended for this purpose, all you have to do is slip the prop over a small screwdriver and see if it hangs perfectly horizontal. If one blade drops, you sand the face of the heavy blade, being careful not to change the airfoil. Never sand the back side of the blade, which determines the pitch. An alternate method would be to apply a coat or two over the years. But the most precise and accurate tool that I have used for many years is the Du-Bro Tru-Spin prop balancer. The Du-Bro balancer actually evolved from the High Point Products balancer, which consisted of two uprights mounted to a base with overlapping aluminum discs supported on precision ball bearings.

The prop, mounted on a shaft, rested on the discs. Later versions that were marketed by Robart, who make the retractable landing gears, eliminated the ball bearings. The original High Point balancers are no longer available, but the Du-Bro is basically an improved version that will balance not only aircraft props but also boat props, spinners, wheels, and



**In my opinion, the Du-Bro Prop Balancer is the ultimate device for properly balancing RC propellers.**

done and proved successful. It resulted in a large increase in the aircraft's speed and performance. (For those who do not know, Rare Bear, piloted by Lyle Shelton, set a world speed record for propeller-driven aircraft of 528mph back in 1989. This record has yet to be broken.)

### HARD START

✉ I have a fairly new Thunder Tiger .75 four-stroke engine that, up until now, ran very well. It was last run at the end of the flying season last fall and was removed from the airplane and well lubricated with after-run oil in the carb and piston and stored in a closed plastic bag. My first attempt to start the engine this year seemed normal until I attempted to remove the glow igniter, which, in turn, caused the plug to unscrew while the engine was still running. I tightened

the plug but could not get it to start up again. I removed the plug and noticed that the element was badly deformed and only partially glowing, so I installed a new O.S. F-type plug. It will start but only runs briefly, and always abruptly quits when throttle is advanced to full. I checked all the fuel lines, including those in the tank, and blew air through the fuel nipple to check for any obstructions. When I remove the fuel line from the nipple, there is fuel pouring out, so I know there is fuel getting to the engine. At this point, the engine will only start with a direct prime in the carb or by blocking off the muffler and turning with an electric starter, but it will only run briefly for 30–40 seconds and then quit even with the igniter still attached. I did notice that, even when choking the engine using my finger and turning the prop, it appears unable to draw any fuel in as the engine doesn't appear to be "wet." I should also note that the engine is mounted inverted, and the fuel that I'm using is Byron 15% nitro and 16% oil castor/synthetic blend (which I increased to 20% oil based on the manufacturer's recommendations). Any help you could provide would be most appreciated. Thank you for sharing your vast knowledge of RC engines with all of us. I always enjoy reading your column in *Model Airplane News*.—Dave Lucas, via e-mail

helicopter rotor heads; it is the ultimate in precision prop balancers. Here's a side note related to propeller balancing that I think some of our readers might find interesting. Back in the 1980s and '90s, my son was director of maintenance for a company named Ameriflight, located at Bob Hope Airport in Burbank, California. One day, a fellow showed up with a system made by Chadwick-Helmuth that would balance—both statically and dynamically—an aircraft propeller with the engine running. This immediately resulted in a reduction in vibration, more horsepower, and higher air speed at the same power setting as well as extended airframe life and less pilot fatigue. One of my son's technicians bought one of the systems and started balancing propellers after work hours and on weekends. Word got around and one of the owners of the Reno Pylon racer named Rare Bear (which I am sure those that follow full-scale pylon racing know about) asked him to balance their prop. The problem they faced with Rare Bear was tying it down for a full-throttle run-up as it would drag everything they tied it to. They tried chaining it to a bulldozer chained to a telephone pole, but the ship bounced around so much that they could not get an accurate reading. Someone suggested they take a reading with the ship rolling down the runway, which was



**You gotta bet proper propeller balancing is important with the full-size Rare Bear Reno Racer!**



## ENGINE CLINIC

**Answer:** Dave, the fuel might be reaching the carburetor but going no further. You have a blockage in the carburetor itself. Use a fuel bulb and force fuel through the carburetor under pressure. Then block the end of the spray bar with your finger and force the fuel through again. This will unblock any foreign matter in the tiny spray-bar hole. Also check the back-cover screws for tightness. I would appreciate hearing if this solves the problem.

### LOW COMPRESSION

✉ I am having a problem with my O.S. 70. I have had this engine for more than five years and never performed any maintenance; it has always run perfectly. However, I have recently noticed that the motor has no compression and will spin with just the flick of your finger. I love this engine and have never had any issues with it. It still runs great at higher rpm, but the low compression concerns me when the engine is idling. It sounds like it wants to stall. I would love to get this engine back to ideal condition, and I want your opinion on what I should do. I have never disassembled a four-stroke before, and I know there could be a few things causing the low compression (piston and sleeve, ring, or valves). Do you think I should send the motor back to O.S. and have them look at it? I know their quotes can sometimes be high. Or should I attempt to fix the motor myself? I appreciate your time.—Tommy Hammond, via e-mail

**Answer:** Tommy, nothing lasts forever, and after five years of flying, your engine has undoubtedly seen a lot of wear. However, even a worn-out engine should still have some compression. My guess would be that one or both valves are sticking open. Remove the muffler, stick a finger over the exhaust port, and turn the engine over. If the compression has returned, the valve is sticking. If there's still no compression, remove the carburetor and intake tube, and do the same with the intake port. Still no compression? Then cover both ports at the same time and turn the engine over. Again, if there's no compression, then you have either blown a head gasket or the ring is frozen. To free up a stuck valve, inject a penetrating oil, such as 3-In-One or Marvel Mystery Oil, into the exhaust and intake ports. Then remove the rocker cover, and with the piston at top center on the compression stroke when both valves should be closed,

compress the leaking valve spring with a small screwdriver and let the screwdriver slip off the side of the spring so that the valve snaps shut. Do this three or four times and the compression should have returned. If not, you might want to check with Bill Jensen of BJ's Model Engine Service, who works on just about all makes of engines ([bj-model-engines.com](http://bj-model-engines.com)).

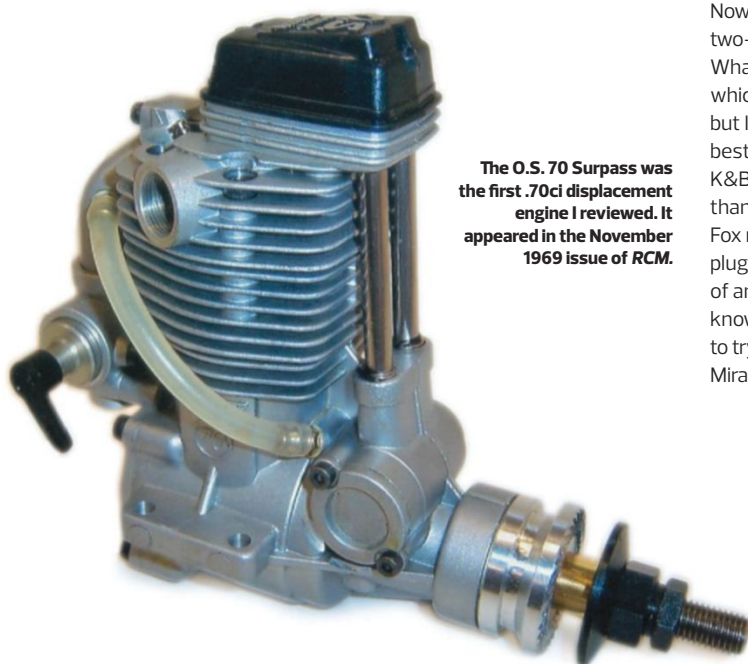
### FUEL FORMULA

✉ I am trying to recall the fuel formula from back in the old Veco days. Was it something like 5% nitro, 20% castor, and the rest methanol? Also, what is the best plug for this engine/fuel combo? Fox Miracle perhaps?—Lyman Slack, Gainesville, FL

**The old RC Veco engines worked great with 10–15% nitromethane and 22% castor oil.**



**Answer:** Lyman, the recommended fuel formula for the old Vecos was 10–15% nitromethane, 22% castor oil, and the balance methanol. Nowadays, Klotz Synthetic can replace the castor. Klotz markets several two-stroke oils intended for motorcycles, snowmobiles, and the like. What you want is KL-200, known as "Good Old Klotz." You did not say which of the Veco engines you were talking about in regard to glow plugs, but I assume it is the RC. All of the RC engines (i.e., 19, 45, and 61) worked best with an idle bar plug. Initially, this was the Veco RC and later K&B RC. However, the K&B idle plugs haven't been available for more than a year now. The Fox idle bar plug was also an excellent plug, but with Fox now out of business, it might be hard to find. Likewise, the Fox Miracle plug, which would be my third choice if you can find one. I do not know of anyone making an idle bar plug. If any of our readers do, please let us know. Other than just using a standard non-idle bar plug, you might want to try the O.S. four-stroke plug, which has the extended nose, like the Fox Miracle plug. I have had good luck with them in the K&B 61. ✈



**The O.S. 70 Surpass was the first .70ci displacement engine I reviewed. It appeared in the November 1969 issue of RCM.**





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# LET'S TALK GIANT SCALE

BY JOHN GLEZELLIS



For your giant-scale aircraft to perform properly, its hinges need to be properly sized and installed correctly.

## A closer look at control-surface hinging

While building a giant-scale airplane, there are many decisions you need to make that can affect whether you experience flutter. Proper servo and linkage selection is mandatory for preventing this from happening. Hinge design and installation is also every bit as important as the linkage you use. Assuming that you, indeed, install the proper servo and linkage for your airplane, this article will highlight the various hinges that can be used and how to properly install them. Flying aerobatic maneuvers can be quite demanding on an aircraft, and you don't want the hinges to fail.

### OPTIONS

In many cases, the hinges you select are an attempt to copy what was done on the full-size aircraft. Other times, hinges are chosen because of how easy they are to install. The basic hinge designs are CA (glued) hinges, captured pin hinges, hinges with removable pins, and round hinges that are inserted into holes drilled into the control surfaces. Let's take a closer look at what's available.

Robart 3/16-inch Super Hinge Point hinges are ideal for most giant-scale wings and for tail sections that have an airfoil shape. These hinges feature two round halves that have

barbs molded in and are joined at the center pivot point with a metal pin. Easy to install, the glue that holds them in place also causes the wood to swell, further securing them in the built-up structure.

Du-Bro makes heavy-duty molded nylon hinges that are 3/4 inch wide and about 1 3/8 inch long. The hinge halves are joined with a removable cotter pin, so if you need to remove your control surface for repairs, it is an easy procedure. Some modelers replace the cotter pins with a long piece of piano wire, which forms the pivot pin for all the hinges in a particular control surface. This also allows the

control surface to be removable.

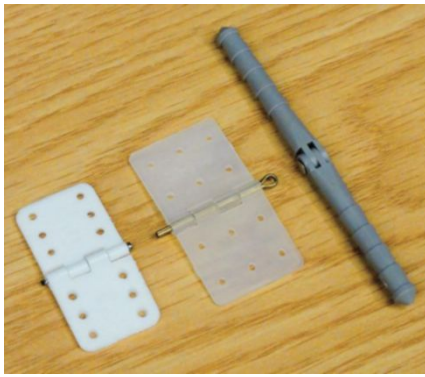
Strap hinges available from CB Associates feature a brass insert. Frank Tiano, of Top Gun fame, is also an professional RC model builder and pilot, and he used these strap hinges in his most recent scale warbird build. Frank comments, "They have very free movement and are easy to install because of their flat cross-sections and rigidity. The length of the one side allows the hinge to be recessed deeply into the leading edge of the control surface, if required, while still allowing extreme control-surface movement."

### INSTALLATION

To determine the number of hinges required for a given control surface, use the general rule of one hinge for every rib in the control surface. In the end, the weight of a few additional hinges won't amount to much, but using too few of them can ultimately cause the loss of your plane to flutter on the first flight.

To simplify the hinging process, certain tools are available. Both Du-Bro and Robart offer centering guide tools that are adjustable and





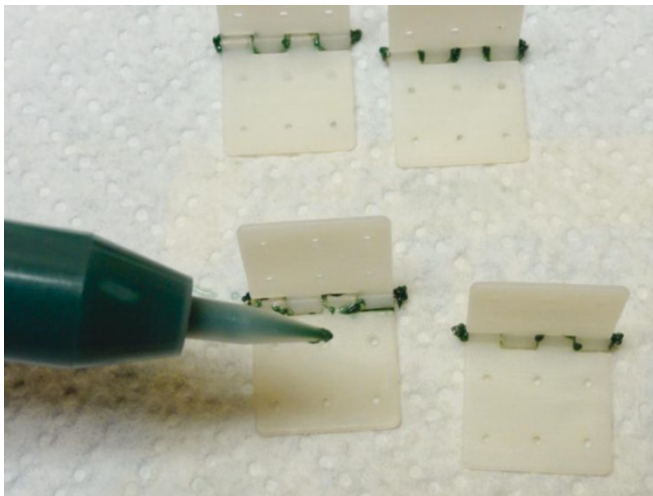
For giant-scale applications, the most common hinges used today are heavy-duty CA hinges, pin hinges, flat pinned hinges, and strap hinges. Shown here are two of these variations: a flat pinned hinge as well as a pin hinge.



Robart and Du-Bro offer tools that assist the builder in making the necessary hinge slots. Always examine what the manufacturer of your particular hinge offers to decrease your workload and to ensure proper hinge alignment.



The Du-Bro hinge tool was used on the horizontal stabilizer of this Super Decathlon. As one can see, the hinge location is perfectly centered, which is required for the tail surfaces on this model. Hinge locations may differ, though, depending on whether the hinge is intended for a flap or other surface where a centered pivot point might not be required.



To prevent the adhesive from entering the pivot point of the hinge, apply bearing grease to the cotter pin and pivot-point location.



A properly hinged control surface should deflect downward under its own weight.

help you easily find the center of the control surface and the actual drill or slot location. Use a ruler and a felt-tip pen to mark the centerline, then determine the locations for each hinge, lengthwise, so that all hinges are equally spaced from one another.

If you decide to install a flat pinned hinge, begin by cutting the slots for each hinge location using a sharp hobby knife, then switch to the hinge slotter tool set from Du-Bro. This kit contains the four slotting tools needed to increase the slot-width opening to the desired thickness and length. When each slot is finished, the hinge can be easily inserted and removed from the surface. In the case of the Robart Hinge Points, a 3/16-inch drill bit is used with the drill centering guide.

Regardless of the hinge type used, the pivot point of the hinges should be slightly recessed into the control surface to minimize the hinge-line gap. For Hinge Points, a Dremel Moto-Tool fitted with a round sanding bit can easily produce a half-round inset for the knuckles of the hinges to sit properly and allow free movement.



On some applications, Frank Tiano uses strap hinges that are available from CB Associates. The hinges offer a great amount of surface area for glue adhesion and are rigid for giant-scale applications. (Photo by Frank Tiano)

## LET'S TALK GIANT SCALE

### HINGE PREP

A few additional steps are needed before gluing your hinges in place. For plastic hinges, the surface of the hinge tabs should be scuffed using 80-grit sandpaper to roughen the surface where the glue is applied. Clean the hinges with rubbing alcohol, and allow them time to dry. To prevent the glue from binding the hinge pins, apply either petroleum jelly or a light grease (using a syringe) to the hinge pivots. For adhesives, many choose 30-minute epoxy. When using an adhesive that has a critical working time, it is important to divide the hinging process into two steps. The first step will be to install all hinges on the control surface; remember—all hinges must be properly aligned. As soon as the adhesive fully cures, hinge the main component. I prefer to use a medical syringe when working with epoxy combined with milled fiber to thicken the adhesive. This keeps the working area clean from any unneeded epoxy as it lets you inject the epoxy only in the desired area. Throughout



**To make a control surface removable, which is sometimes required depending on the vehicle one uses for transportation both to and from the flying field, some hinges feature a removable cotter pin that can be substituted with a piano wire of the same outside diameter.**



**To remove a pin hinge, select a brass tube that has an inner diameter that is only slightly larger than the outer diameter of the actual hinge. Using a file, score one side of the brass tube so that it contains numerous "teeth."**



**The brass tube is inserted over the rear of the hinge. Done properly, the tube will eventually cover the entire hinge for removal.**



**Shown here, the replacement hinge can be inserted from the rear of the control surface.**

the entire process, it's handy to have some rubbing alcohol and paper towels around to help you clean any undesired epoxy once the hinge is glued in place. After the hinging process is complete and the adhesive has cured, conduct a simple pull test to assure that all the components are working properly and are securely glued in place.

### HINGE REMOVAL

In the event that a CA-type or a flat pinned hinge becomes damaged, simply cut through the center of the CA hinge using a hobby knife, or remove the cotter pin or piano wire. Remove the rest of the hinge using a hobby knife and

needle-nose pliers, and prepare the surface for a new hinge.

With Robart Hinge Points, you can cut the damaged hinge flush against the surface and then drill a new hinge locations next to original location. Remove the covering to ensure that the proper support material exists in the new hinge location, and install a new one.

A better method for the proper removal of a Hinge Point on a built-up structure is to remove the covering and use a piece of K & S brass tubing with an inner diameter that is only slightly larger than the broken hinge. Sharpen the edge of 8-inch-long section of the tube, and file some "teeth" onto the cutting edge.

Chuck your tube cutter into an electric hand drill and apply pressure, as needed, so that the brass tube cuts away the material around the bad hinge. Once the hinge has been removed, install a new Hinge Point.

### FINAL THOUGHTS

While each type of hinge offers slightly different benefits—whether it is ease of the installation or the fact that a control surface can be removed later on—it is important to weigh all your options before starting your project. I hope this article helps you pick the right type for your needs. ✚



# Product Watch

MINI REVIEWS OF EDITORS' FAVORITES



## Pacer Technology Zap-O Foam Safe CA

One of the most well-known modeling adhesives, Zap has been around for decades, and the brand continues to expand its line of CA glue specifically formulated for use with model construction projects. With the shift in the hobby to molded-foam airplanes, it was only logical that Zap would also formulate glue specifically for sticking foam parts and pieces together. The medium-thick Zap-O formula cures in roughly 15 seconds and is a true odorless CA. It has the same gap-filling properties as Zap-A-Gap CA+ but without the strong fumes. To cure properly, Zap-O Foam Safe CA must be used with Zap Foam Safe Kicker. It also works great on balsa, plywood, basswood, and most other modeling and hobby materials. I have been using Zap adhesives for many years, and I tested the Zap-O/Foam Safe Kicker combo on several materials including EPS foam, cell foam, carbon fiber, foam board, polystyrene plastic, balsa, and plywood. Just like all the other adhesives in the Zap line, Zap-O gets the job done—period!

If you're building a molded-foam airplane and need parts to be glued together, look for the purple Zap label. Give Zap-O (PT-25, 0.7 oz., \$10.07) and the Zap Foam Safe Kicker (PT-28, 2 oz., \$5.59) a try. I highly recommend this combo. It is also great stuff to keep in your field box for quick and easy field repairs.

—Gerry Yarrish  
franktiano.com

## Sullivan Products ProFlex Universal Fuel Line

Besides battery failure, one of the leading causes of dead-stick landings and damaged airplanes is engine-fuel starvation. We've all experienced that moment when the noisy thing pulling your airplane through the air goes silent. With time, the alcohol in today's gasoline makes the typical gas-compatible fuel line swell to the point that the internal pickup line within the fuel tank simply falls off the output tube and the engine signs off for the rest of the flight. Enter Sullivan Products!

Made from proprietary Fluoroelastomer, ProFlex fuel line will never harden or swell. Impervious to gasoline, glow fuel, diesel, and smoke oil, ProFlex is also heat resistant, so it is great for big-block gas engines and smoke mufflers. The thin-walled fuel line is very flexible and won't kink even in tight bends. It's available in standard and large diameters, and in three lengths: 6-inch (\$3.67–\$4.89), 2-foot (\$7.59–\$8.69), and 12-foot tank replumb kits (\$27.99–\$29.99). Standard clunk tie wires are included in the replumbing kits. I replumbed my giant-scale Fokker triplane powered with a Zenoah GT-80, and I have flown all summer long with the large ProFlex fuel line. After a full season of flying at several giant-scale events, I checked the condition of the fuel line and it is as flexible and as tightly attached to the fuel fittings—and my smoke pump and smoke mufflers—as the day I installed them. I put my trust in hardware and supplies that stand the test of time. So far, things are looking good. —Gerry Yarrish  
sullivanproducts.com



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comp at \$17.99

39974501

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**SUPER COUPON**

**1 TON CAPACITY FOLDABLE SHOP CRANE**

**Includes Ram, Hook and Chain**

**PITTSBURGH**

ITEM 69445 61858/69512 shown

**Customer Rating** ★★★★★

**SAVE \$169**

**\$99.99** ~~\$179.99~~

comp at \$269

39911803

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**SUPER COUPON**

**3-POINT QUICK HITCH**

**HaulMaster**

ITEM 97214

**Customer Rating** ★★★★★

**\$89.99** ~~\$99.99~~

comp at \$199.99

**SAVE \$110**

• 2000 lb. capacity

• 27-3/16" Clearance

39953048

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**SUPER COUPON**

**8750 PEAK/7000 RUNNING WATTS**

**13 HP (420 CC) GAS GENERATORS**

**PREDATOR**

ITEM 68530/63086 69671/63085 shown

ITEM 68525/69677 63087/63088 CALIFORNIA ONLY

**Customer Rating** ★★★★★

**SAVE \$469**

**\$529.99** ~~\$599.99~~

comp at \$999

39926475

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**WOW SUPER COUPON**

**26", 4 DRAWER TOOL CART**

**US\*GENERAL**

ITEM 61634 61952 95659 shown

**Customer Rating** ★★★★★

**SAVE \$219**

**\$99.99** ~~\$159.99~~

comp at \$319.01

39944101

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**VALID NOW ON 5,000+ ITEMS**

**20% OFF**

ANY SINGLE ITEM

39936784

**WOW SUPER COUPON**

**2.5 HP, 21 GALLON 125 PSI VERTICAL AIR COMPRESSOR**

**CENTRAL PNEUMATIC**

ITEM 69091/61454 61693/62803 67847 shown

**Customer Rating** ★★★★★

**SAVE \$347**

**\$149.99** ~~\$179.99~~

comp at \$497

39982062

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**SUPER COUPON**

**HEAVY DUTY HAND TRUCK**

**HaulMaster**

ITEM 95061 shown 62715/62776/62973

**Customer Rating** ★★★★★

**SAVE 41%**

**\$34.99** ~~\$41.99~~

comp at \$59.99

39957781

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**SUPER COUPON**

**3-IN-1 PORTABLE POWER PACK WITH JUMP STARTER**

**CENTECH**

ITEM 38391 62376 62306 shown

**Customer Rating** ★★★★★

**SAVE NOW**

**\$47.99** ~~\$59.99~~

39947420

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**SUPER COUPON**

**2500 LB. ELECTRIC WINCH WITH WIRELESS REMOTE CONTROL**

**BADLAND**

ITEM 61258 shown 61840/61297/68146

**Customer Rating** ★★★★★

**SAVE \$105**

**\$54.99** ~~\$89.99~~

comp at \$159.99

39981682

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**SUPER COUPON**

**7 FT. 4" x 9 FT. 6" ALL PURPOSE WEATHER RESISTANT TARP**

ITEM 69249/69115/69137 69129/69121/877 shown

**Customer Rating** ★★★★★

**SAVE 64%**

**\$2.99** ~~\$4.99~~

comp at \$8.48

39992466

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**SUPER COUPON**

**12" SLIDING COMPOUND DOUBLE-BEVEL MITER SAW WITH LASER GUIDE**

**CHICAGO ELECTRIC POWER TOOLS**

ITEM 69684 shown 61969/61970

**Customer Rating** ★★★★★

**SAVE \$259**

**\$139.99** ~~\$199.99~~

comp at \$399

39916204

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**SUPER COUPON**

**1500 LB. CAPACITY MOTORCYCLE LIFT**

**PITTSBURGH**

ITEM 69995 shown 60536/61632

**Customer Rating** ★★★★★

**SAVE \$65**

**\$69.99** ~~\$89.99~~

comp at \$135

39962491

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**WOW SUPER COUPON**

**TILTING FLAT PANEL TV MOUNT**

**176 lb. capacity**

ITEM 62289 61807 shown

**Customer Rating** ★★★★★

**SAVE 65%**

**\$19.99** ~~\$29.99~~

comp at \$57.37

39946604

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 4/6/17. Limit one coupon per customer per day.



# HARBOR FREIGHT

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## WOW SUPER COUPON

### Customer Rating ★★★★★

#### 44", 13 DRAWER INDUSTRIAL QUALITY ROLLER CABINET

US \*GENERAL ITEM 68784 shown 69387/62744/63271

- Weighs 245 lbs.
- 16" deep drawers have folded edges for extra strength and detents to secure the drawers when closing.
- Narrow drawer width (x6): 12-5/16"
- Wide drawer width (x6): 22-3/8"
- Extra-Wide drawer width (x1): 36-7/8"
- Heavy duty 1-3/8" ball-bearing drawer slides are riveted to the cabinet for smooth and durable drawer use

**\$359.99** ~~\$379.99~~ **SAVE \$670** comp at \$1029.99

40039027

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## SUPER COUPON

### FREE

WITH ANY PURCHASE

#### CENTECH 7 FUNCTION DIGITAL MULTIMETER

ITEM 90899 shown 88025/69096

**\$16.45** VALUE

**LIMIT 1** - Cannot be used with other discount, coupon or prior purchase. Coupon good at our stores, HarborFreight.com or by calling 800-423-2567. Offer good while supplies last. Shipping & Handling charges may apply if not picked up in-store. Non-transferable. Original coupon must be presented. Valid through 4/6/17. Limit one FREE GIFT coupon per customer per day.

40035543

## SUPER COUPON

### RAPID PUMP® 1.5 TON ALUMINUM RACING JACK

PITTSBURGH AUTOMOTIVE

- 3-1/2 Pumps Lifts
- Most Vehicles
- Weighs 34 lbs.

Customer Rating ★★★★★

ITEM 62160/62496/69252 62516/68053/60569 shown

**\$59.99** ~~\$89.99~~ **SAVE \$60** comp at \$119.99

40067511

**LIMIT 5** - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 4/6/17. Limit one coupon per customer per day.

## SUPER COUPON

### 17 FT. TYPE I A MULTI-TASK LADDER

HaulMaster

- 300 lb. capacity
- 23 configurations

ITEM 62656/62514 67646 shown

Customer Rating ★★★★★

**\$119.99** ~~\$139.99~~ **SAVE \$238** comp at \$357.99

40004809

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## SUPER COUPON

### 10 FT. x 17 FT. PORTABLE GARAGE

COVERPRO

ITEM 62859 shown 62860/63055

Customer Rating ★★★★★

**\$179.99** ~~\$109.99~~ **SAVE \$146** comp at \$326.55

40032329

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## SUPER COUPON

### 18 VOLT CORDLESS 3/8" DRILL/DRIVER WITH KEYLESS CHUCK

drillmaster

ITEM 69651/62868/62873 68239 shown

Customer Rating ★★★★★

**\$16.99** ~~\$19.99~~ **SAVE 65%** comp at \$49.21

40005955

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## SUPER COUPON

### MECHANIC'S GLOVES

HARDY

ITEM 62429 shown

Customer Rating ★★★★★

**\$3.99** ~~\$5.99~~ **SAVE 73%** comp at \$14.97

40014503

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## SUPER COUPON

### 3/8" x 50 FT. HEAVY DUTY PREMIUM RUBBER AIR HOSE

Diablo

ITEM 62890 shown 61939/62884/69580

Customer Rating ★★★★★

**\$19.99** ~~\$24.99~~ **SAVE 33%** comp at \$29.98

40032136

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## SUPER COUPON

### 10" PNEUMATIC TIRE

ITEM 69385 62388 62409 62698 30900 shown

Customer Rating ★★★★★

**\$3.99** ~~\$5.99~~ **SAVE 73%** comp at \$14.99

40002310

**LIMIT 7** - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 4/6/17. Limit one coupon per customer per day.

## SUPER COUPON

### 3 PIECE DECORATIVE SOLAR LED LIGHTS

one stop gardens

ITEM 60561 69462 shown

Customer Rating ★★★★★

**\$8.99** ~~\$11.99~~ **SAVE 70%** comp at \$29.99

40007169

**LIMIT 9** - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 4/6/17. Limit one coupon per customer per day.

## SUPER COUPON

### WIRELESS SECURITY ALERT SYSTEM

Bunker Hill Security

ITEM 93068 shown 69590/61910/62447

Customer Rating ★★★★★

**\$11.99** ~~\$16.99~~ **SAVE 60%** comp at \$29.99

40049230

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## SUPER COUPON

### 42" OFF-ROAD FARM JACK

PITTSBURGH AUTOMOTIVE

- 3-1/2 ton capacity

ITEM 60668/6530 shown

Customer Rating ★★★★★

**\$45.99** ~~\$57.99~~ **SAVE 23%** comp at \$59.99

40052404

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## SUPER COUPON

### 29 PIECE TITANIUM NITRIDE COATED HIGH SPEED STEEL DRILL BIT SET

WARREN

ITEM 62281 61637 shown

Customer Rating ★★★★★

**\$12.99** ~~\$19.99~~ **SAVE 78%** comp at \$59.97

40039643

**LIMIT 6** - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 4/6/17. Limit one coupon per customer per day.

## SUPER COUPON

### 4 PIECE ANTI-FATIGUE FOAM MAT SET

ITEM 61607 62389 94635 shown

Customer Rating ★★★★★

**\$6.99** ~~\$9.99~~ **SAVE 61%** comp at \$17.97

40053723

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## SUPER COUPON

### 1.51 CUBIC FT. SOLID STEEL DIGITAL FLOOR SAFE

UNION SAFE COMPANY

ITEM 91006/62678 62977 shown

Customer Rating ★★★★★

**\$99.99** ~~\$129.99~~ **SAVE \$190** comp at \$289.99

39992803

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# Final Approach

BY THE **MODEL AIRPLANE NEWS CREW** PHOTOS COURTESY OF **3W INTERNATIONAL**

Both of these fixed-wing drone designs were flown in the harsh environment of the Antarctic.



The team poses with the Tiburon Jr. after a successful test flight.



## Antarctic Airborne Research

### Gas-powered drone gets the job done

**W**hat's new at the bottom of the planet? (By the "bottom," we're referring to Antarctica.) Well, over the years, scientists have been increasingly concerned about the impact of climate change on the east Antarctic ice sheet—the largest body of ice on earth—so the area has become a hotbed for scientific study. Kevin Bass of Intuitive Machines and drone pilot Mike Laible, in cooperation with the UTIG (University of Texas Institute for Geophysics) and ICECAP (Investigating the Cryospheric Evolution of the Central Antarctic Plate), recently flew multiple times with a 3W gasoline engine–powered unmanned aerial vehicle (UAV): the Tiburon Jr. Until now, ICECAP used WW II–era Douglas DC–3 cargo planes equipped with instrumentation to record the thickness of the ice sheets and to measure the composition, density, and topography of the rocks below the ice.

Equipped using autopilot with full autonomous flight capability and first-person-view pilot interaction, the Tiburon Jr. UAV provided significant savings in operational costs and time. Being a fixed-wing drone, the Tiburon Jr. is able to reach target areas faster than current electric-powered multirotor UAVs. With its impressive loiter endurance time of 15 to 40 hours and a maximum speed of 80 knots, the Tiburon Jr. easily filled the gap between conventional UAV drones and more expensive manned aircraft. With its interchangeable nose cone and lightweight carbon-fiber construction, it can accommodate various modular sensor pods for a variety of tasks including

visible, infrared, and multispectral options as well as other payload demands.

Battling harsh weather and constantly changing conditions, the drone team was able to successfully fly the Tiburon Jr. on several missions while also testing the viability of its new onboard software designed to control its various sensors. A key feature of the drone's design and a contributor to its impressive performance was the 3W–28iCS engine based on a 3W RC airplane powerplant. With more than 30 years of engine-manufacturing experience, 3W International has been developing a new generation of gasoline and heavy-fuel engines for the UAV industry. The single-cylinder 3W–28iCS gasoline engine develops 2.9hp and was optimized for enhanced performance in the extreme and hazardous environment. The combination of drone and engine were able to successfully accomplish this critical job. ✈

The team prepares the two drones for another flight.





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